JULY 1948

# Railway Engineering and Maintenance

*The Symbol of Dependable Anchorage*

THE IMPROVED FAIR

*Santa Fe Railway*
*Cajon Pass, California*

THE RAIL CO.

CHICAGO • NEW YORK • DENVER • WASHINGTON • ST. LOUIS • CLEVELAND • ST. PAUL • BOSTON • SAN FRANCISCO
MEXICO D. F.

# NIGHT AND DAY LABOR SAVERS

Reliance Hy-Pressure Hy-Crome Spring Washers on rail-joint bolts are on the job 24 hours a day, extending the interval between maintenance periods and reducing costs. When a heavy freight pounds along, or a fast express whizzes by over a rail joint, the powerful reactive pressure of Reliance Hy-Pressure Spring Washers is at work offsetting the effects of wear and bolt elongation resulting from stresses and strains developed by heavy wheel loads and high speeds. Round the clock, keep rail joints *tighter—longer* with Reliance Hy-Pressure Hy-Crome Spring Washers.

*Edgemark of Quality*

*Reliance* HY-PRESSURE HY-CROME *spring washers*

**EATON**

**EATON MANUFACTURING COMPANY**

**RELIANCE DIVISION**
Offices and plant: MASSILLON, OHIO

Sales Offices: New York • Cleveland • Detroit • Chicago • St. Louis • San Francisco • Montreal

# NO-OX-ID "A" SPECIAL

## Prevents Rust and Lubricates Fishing Area of Rail Joints

Maintenance men have long looked to NO-OX-ID to insure rail joints a longer, corrosion-free life. They know that application of NO-OX-ID stops metal loss immediately, seals out moisture, brine drippings, and other corrosion exciters. Its chemical inhibitors eliminate under-film corrosion. And the flexible, nondrying coating also serves as a lubricant to prevent "freezing."

↑ Rail ends and surfaces of joint bar are wire brushed to remove adhering dirt and rust.

← NO-OX-ID Coating is applied with a brush to fishing area of rail, angle bars, track bolts, and rail ends.

# *Now* ... You can seal in that protection with NO-OX-ID Joint Bar Filler

● Now comes NO-OX-ID Joint Bar Filler to plug the open ends of joint bars ... *seal in* the protective benefits of the rust preventive coating and joint bar lubricant.

The new plastic rust preventive compound also contains corrosion inhibitors; is tough, elastic, easily applied. After the joint is permanently assembled, Joint Bar Filler is placed in open ends in sufficient quantity to fill a 3-inch space back from bar end. A final tapering and smoothing operation completes the application.

NO-OX-ID Joint Bar Filler will not shrink or fall out. The joint remains sealed against action from rush of air and accompanying dirt, grit, brine, etc., from high-speed traffic. All users of NO-OX-ID Joint Bar Filler are reporting outstanding results. Write for descriptive circular.

↑ A marginal trowel is the only tool necessary for placing NO-OX-ID Joint Bar Filler behind bar end and for final smoothing operation.

*"The Original Rust Preventive"*

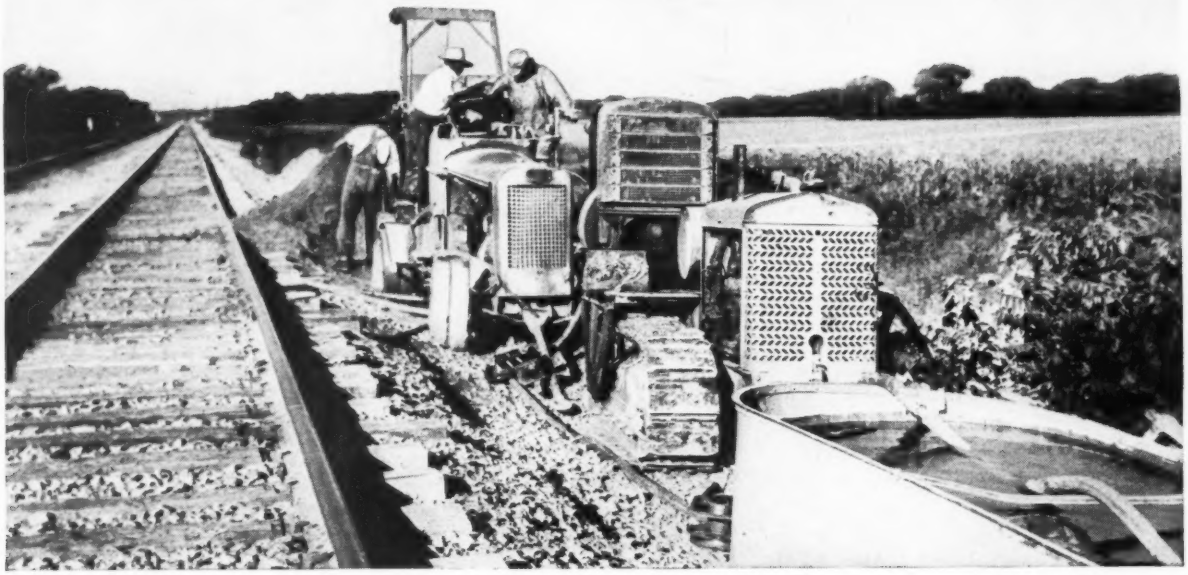
**DEARBORN CHEMICAL COMPANY**

Dept. U, 310 S. Michigan Ave., Chicago 4, Ill.

New York • Los Angeles • Toronto

Published monthly by Simmons-Boardman Publishing Corporation, 105 W. Adams St., Chicago 3, Ill. Subscription price: United States and Possessions, and Canada, $2.00 for one year; $3.00 for two years. Single copies 50 cents. Entered as second-class matter January 20, 1933, at the post office at Chicago, Ill., under the act of March 3, 1879, with additional entry at Mount Morris, Ill., post office. Address communications to 105 W. Adams St., Chicago 3, Ill.

# STABILIZE "SOFT TRACK" THIS PROVED WAY



## Use the Texaco method of asphalt-cement pressure grouting

THE *Texaco* method of asphalt-cement pressure grouting – using *Texaco No. 24 Emulsified Asphalt*—is the fastest, simplest and most effective way to stabilize "soft track," reduce slow orders and cut track maintenance costs. This has been proved by the experience of one of the nation's leading railroads.

*Texaco No. 24 Emulsified Asphalt* was especially developed for grouting. It makes the grout flow more readily, penetrate more thoroughly, and seal more permanently. It also waterproofs the soil and keeps it resilient longer. Yet, only small quantities need be used.

For complete details, read the informative book shown below, or speak with a Texaco representative. Contact the nearest Railway Sales Division Office listed below, or write The Texas Company, *Railway Sales Division,* 135 East 42nd Street, New York 17, New York.

**SEND FOR** this fact-packed, 16-page, illustrated book. Describes the development of asphalt-cement pressure grouting, outlines a practical working set-up, shows costs, and benefits secured by a leading railroad.

NEW YORK • CHICAGO • SAN FRANCISCO • ST. PAUL • ST. LOUIS • ATLANTA

TEXACO

# TEXACO Emulsified Asphalt FOR GROUTING

TUNE IN...TEXACO STAR THEATRE every Wednesday night featuring Gordon MacRae and Evelyn Knight...ABC Network

# Smooth Handling for SAFER OPERATION

**for the heart of those jobs ON THE LINE**

Jobs along the line call for a smooth handling machine, one that can move out of the way quickly and surely, one with dependable controls and plenty of versatility.

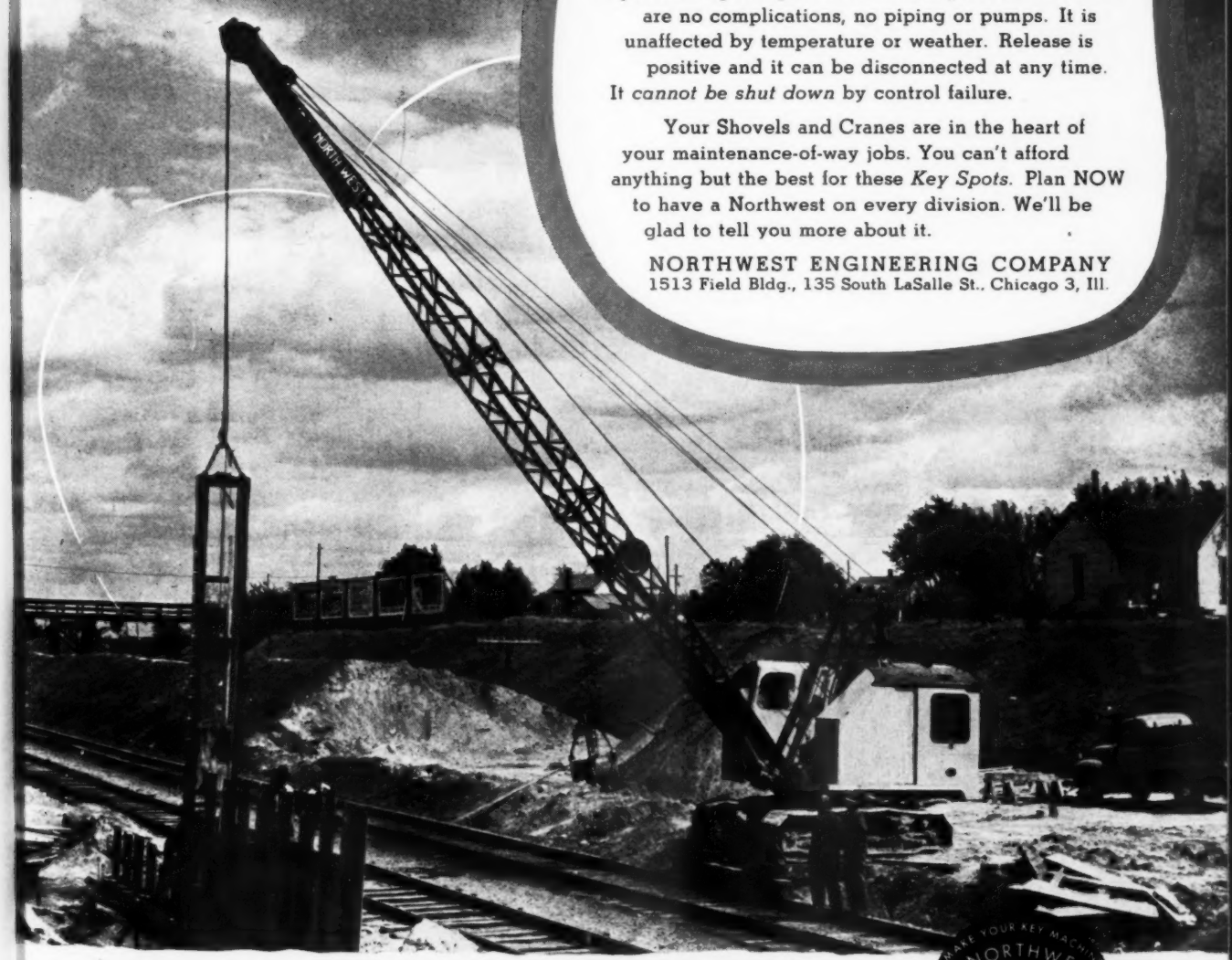
The Northwest Crawler Crane has been proved an ideal railway man's tool.

Northwest Crawlers and Northwest Steering negotiate bad ground conditions and rails. The larger Northwests bring you positive traction on both Crawlers while turning as well as when going straight ahead.

The Northwest "Feather-Touch" Clutch Control makes operation easy. The *feel of the load* is always present. Spotting loads is smoothly accurate. There are no complications, no piping or pumps. It is unaffected by temperature or weather. Release is positive and it can be disconnected at any time. It *cannot be shut down* by control failure.

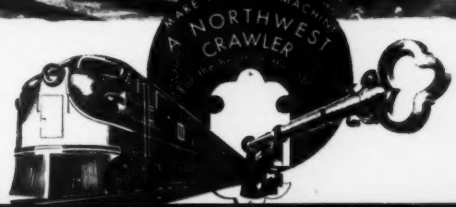
Your Shovels and Cranes are in the heart of your maintenance-of-way jobs. You can't afford anything but the best for these *Key Spots*. Plan NOW to have a Northwest on every division. We'll be glad to tell you more about it.

NORTHWEST ENGINEERING COMPANY
1513 Field Bldg., 135 South LaSalle St., Chicago 3, Ill.




# NORTHWEST

**THE ALL PURPOSE RAILROAD MACHINE**
**SHOVEL • CRANE • DRAGLINE • PULLSHOVEL**



# Years of Shelter *Built in a Day*

It takes only a few hours to erect a Standard ARMCO STEELOX Building, and you have a strong, sturdy structure that will last for years.

The unique STEELOX joint does the trick. Individual panels go into place like magic to provide both structural support and finished surface. For sidewalls they save framing and outside covering. On the roof they replace rafters, sheathing and roofing. Erection is simplified, costs go down, and weathertight construction is assured.

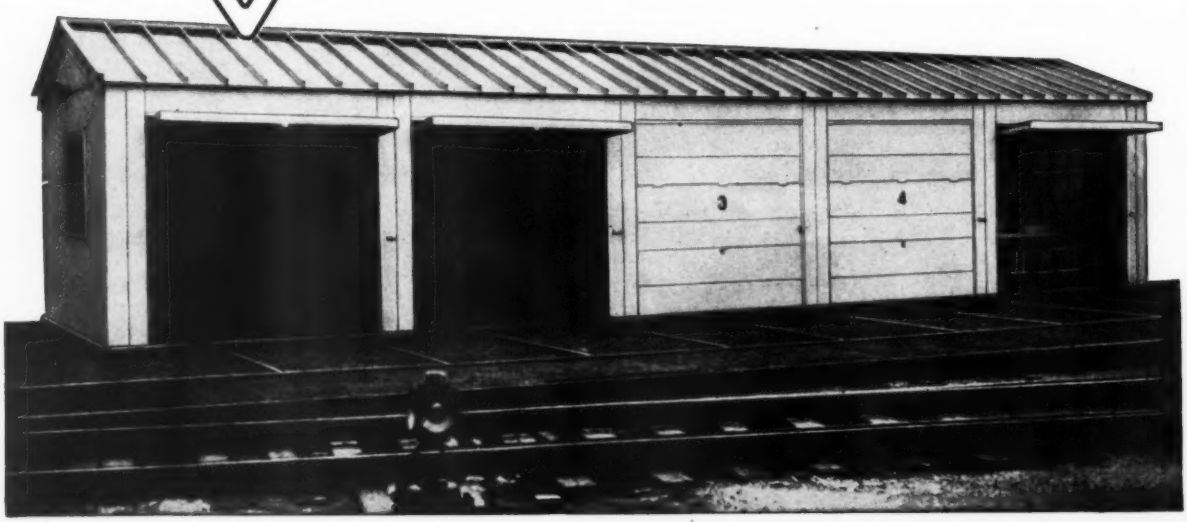
But these are only a few of the advantages. With all their strength, STEELOX Panels are light and easy to handle. A small, unskilled crew quickly makes a strong, tight, fire-resistant structure that combines all the advantages of a permanent building with high salvage value. When used at temporary locations STEELOX Buildings can be quickly dismounted and re-assembled on another site.

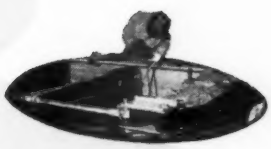
You can get prompt delivery on Standard ARMCO STEELOX Buildings for utility buildings, motorcar garages, offices, warehouses, wayside buildings or wherever else you need an easily-erected, permanent or temporary structure. Write for prices and complete information. Armco Drainage & Metal Products, Inc., 3865 Curtis Street, Middletown, Ohio.

*Export: The Armco International Corporation.*

ARMCO

## ARMCO STEELOX BUILDINGS





## speed up your

# Maintenance Program

## Reduce Your Fabricating and Repair Costs

### ...use efficient P&H electrodes for fast deposition, sound welds, and easy manipulation

***There's a time-saving P&H electrode for every welding problem*** — Steel sheet, some bar stock and channels provide a quick, easy method of giving your old cars the "new look." For work of this kind we recommend two electrodes — the Class E-6010 "AP" rod and the Class E-6012 "PF" rod. These two electrodes can do 90% of all your welding:

**"AP"** *is one of the most versatile of all electrodes* and is applicable to almost every railroad use. Designed for all-position work, it produces welds of X-ray quality, and is especially suitable for use on structural steel, where tied-up stresses are involved.

**"PF"** *solidifies rapidly and makes easy work of welding irregular and poor-fit-up joints.* You find also that this electrode does extremely fine work on sheet metal, and should be used on mild steel whenever you desire high tensile strength.

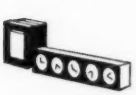
For *building up and hard surfacing worn parts,* your best bet is one of the new P&H Hartop electrodes.

**Nicast,** thanks to its proper coefficient of expansion, is ideal for making machinable repair welds in cast iron, or for joining cast iron to steel.

It pays to use P&H electrodes. Investigate all their money-saving advantages. Consult a P&H railroad representative or write to us.

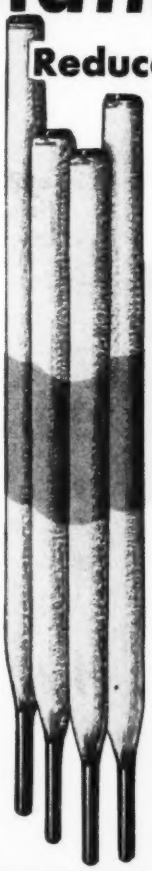
Welding Positioners

AC Welders



Welding Production Control Systems

DC Welders



Electric Hoists

America's Most Complete Arc Welding Service

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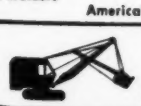
HARNISCHFEGER CORPORATION

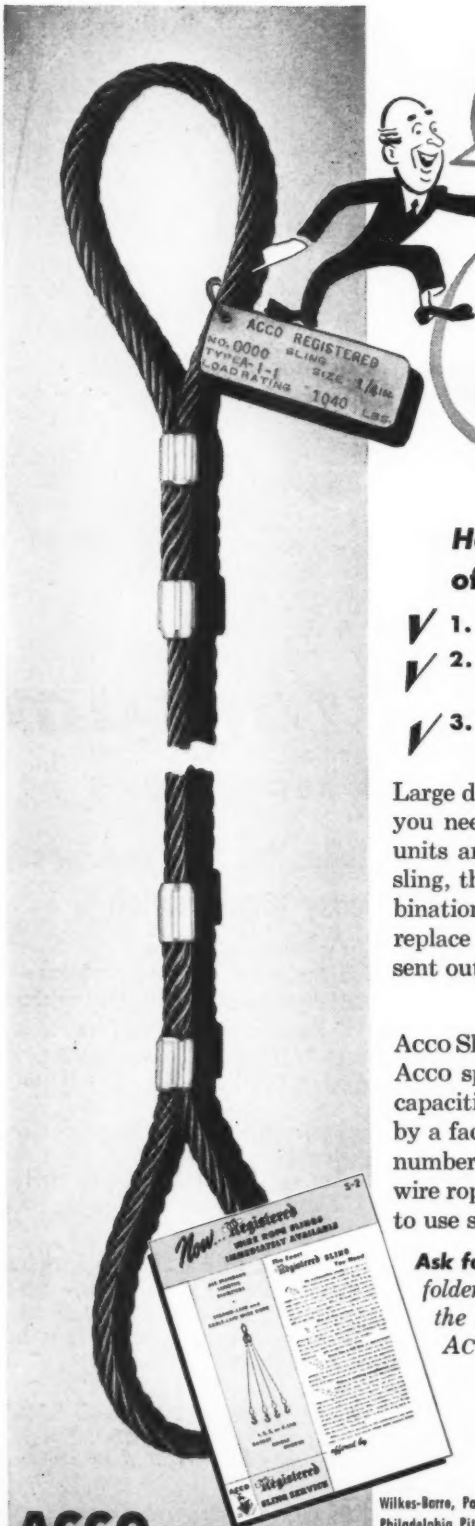
Additional P&H Railroad Equipment



Excavators

Overhead Traveling Cranes

Truck Cranes




# "Make-Your-Own" ACCO Registered 1, 2, 3 or 4-LEG WIRE ROPE SLINGS

## *Here's the way to assemble an unlimited variety of Basket, Bridle or Choker Slings*

1. **Select style of sling from ACCO's *"Make-Your-Own"* Sling wall chart.**
2. **Determine weight of load. Choose sling rope diameter from ACCO's "Maximum Load per Leg" table.**
3. **Check the identification tags on the ACCO Registered Wire Rope Slings in your stock and pick out the units you need.**

Large drawings on the wall chart tell you quickly the exact type of sling you need. You *"make-your-own"* sling from a group of standard sling units and fittings which you carry in your tool room. After using the sling, the parts are disassembled and ready to be made into other combinations. If you damage one leg when used in a multiple-leg sling, you replace only the leg. The complete sling and fittings don't have to be sent out for rebuilding. Slings and fittings never leave your plant.

### Proof-Tested—Registered—Identified

Acco Sling units are factory proof-tested at double their rated capacities; Acco special fittings are tested at two and one-half times their rated capacities. Safety factor is 5 to 1. You get a Registry Certificate signed by a factory engineer. It shows the test load, rated capacity, and serial number. Then, there is a metal identification tag on each sling. It shows wire rope diameter, rated capacity, and serial number. It's the sure way to use slings.

**Ask for Free Literature**—*The S-2 ACCO Registered WIRE ROPE SLING folder tells the complete story. Call your supply house today—or write the nearest ACCO office listed below. You'll save money by using ACCO Registered Wire Rope Slings.*

MEMBER
THE NATIONAL SAFETY COUNCIL

Wilkes-Barre, Pa., Atlanta, Chicago, Denver, Houston, Los Angeles, New York, Philadelphia, Pittsburgh, Portland, San Francisco, Seattle, Tacoma, Bridgeport, Conn.

ACCO

WIRE ROPE SLING DEPARTMENT
AMERICAN CHAIN & CABLE

TRADE MARK

*In Business for Your Safety*

ACCO Registered WIRE ROPE SLINGS

# HERE'S ONE OF THE MOST IMPORTANT FIRES YOU EVER SAW!

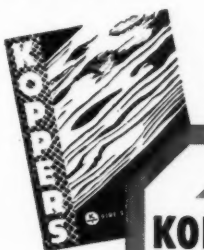
## BECAUSE IT MAY HELP YOU TO PREVENT THEM!

It may sound like a miracle . . . *but fire-retardant wood is here!*

Koppers fire-retardant wood demonstrates its effectiveness in the tests pictured . . . and has several times confirmed it in fires in plants and factories built of the material. These fires were speedily brought under control, with only minor structural damage, *because of the protection given by Koppers fire-retardant treatment.*

Engineers have been quick to recognize the service and economic advantages of Koppers fire-retardant wood, and have applied it in floors, roofing, sheathing and structural members of industrial buildings, garages, airplane hangars, munitions plants, docks and warehouse buildings, railroad engine houses, and other similar structures. Koppers CZC(FR) treatment has a valuable *plus* advantage, *for it also fortifies the wood against decay and termite attack.* Color and paintability are not harmed by the odorless CZC(FR) treatment.

The nation's fire losses in the average year total almost half a billion dollars. Losses can be reduced, lives can be saved, building contents protected, and fire-control efforts aided, through the use of Koppers fire-retardant wood. In its broader utility and multiplied benefits, Koppers fire-retardant wood is practically a *new* structural material. It opens new fields and opportunities for the world's oldest, most versatile, most easily worked, and most desirable structural material.




"Koppers Fire-Retardant Wood" just off the press. Filled with interesting, helpful information. Ask for a copy.

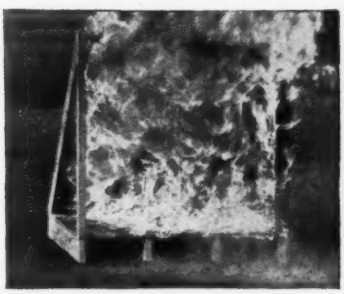
**KOPPERS**

**PRESSURE-TREATED WOOD**

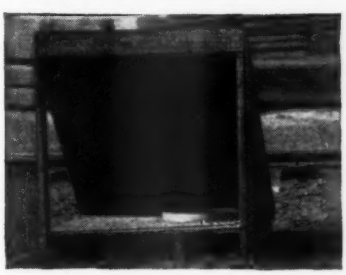
KOPPERS COMPANY, INC.

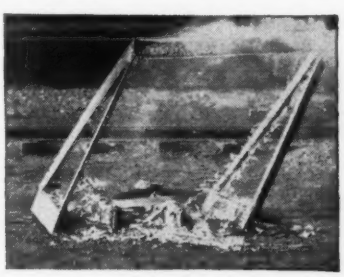
PITTSBURGH 19, PENNSYLVANIA

Test structures built of Koppers fire-retardant wood (left) and untreated wood (right) ready for the fire test. Five quarts of kerosene, placed in pans, furnishes fuel for each blaze.



Both structures are quickly enveloped in flame. Treated structure resists fire, but untreated one encourages it, contributes fuel to the fire.





After twenty-two minutes the untreated structure, still burning, is collapsing. Note that in the treated structure, the fire stopped when the fuel burned out.

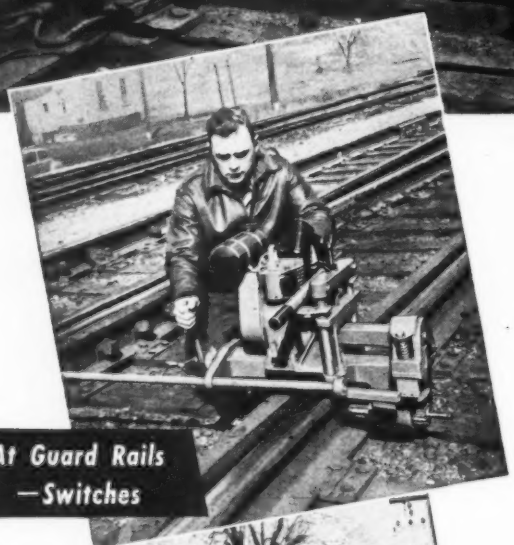
*(Above)* Continued burning reduced the untreated structure to ashes.

*(Left)* The treated structure was charred . . . but retained its integrity and strength, as the 800 pound load shows.

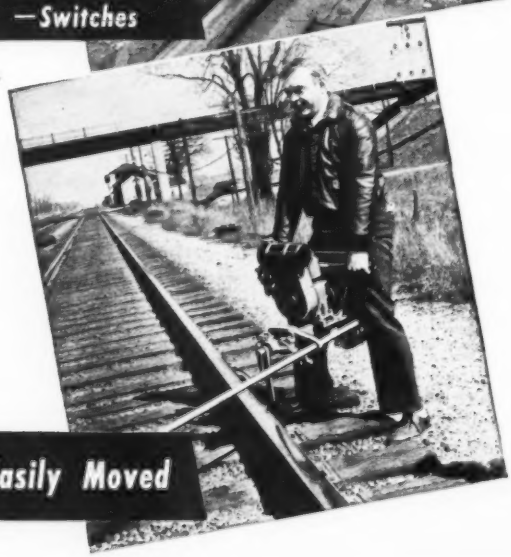
THE

# Rail Drill

FOR WHICH YOU HAVE WAITED



At Guard Rails —Switches



Easily Moved

The Model CD Rail Drill is another contribution of Nordberg to improved machinery that does a better job of track maintenance. It is of simple design, but rugged enough to meet today's demands for speed and production performance.

- *Easily set up. Supported on the rail and not on ties and ballast, correct location for drilling instantly obtained.*
- *Bit protected by spring controlled overload release.*
- *Designed for light weight—132 lbs.*
- *Wide spread of 14 inches permits drilling at heel blocks, switches and guard rails.*
- *Positive acting chuck — no tools required to install flat bit.*

These and other features merit the investigation of this improved drill for use with rail laying gangs, around terminals, yards or wherever rail drilling is done. Write for Bulletin No. 157.

**NORDBERG MFG. CO.**
**MILWAUKEE 7, WISCONSIN**

## NORDBERG TRACK MAINTENANCE MACHINES

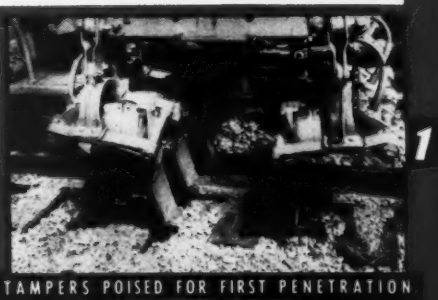
ADZING MACHINE • SPIKE PULLER • TRACK WRENCH • SPIKE HAMMER
RAIL DRILL • POWER JACK • CRIBEX • RAIL GRINDER • TRACK SHIFTER

# JACKSON

MULTIPLE M T TAMPER

One Man Operates
12 Tampers Simultaneously

## OPERATING IN TANDEM

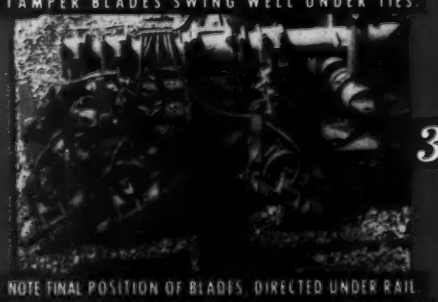


1

TAMPERS POISED FOR FIRST PENETRATION

2

TAMPER BLADES SWING WELL UNDER TIES



3

NOTE FINAL POSITION OF BLADES, DIRECTED UNDER RAIL

## THERE ARE JUST 2 TAMPER OPERATORS INSTEAD OF 24

Two M-T's operating in Tandem usually DOUBLE the daily footage of surfacing gangs without materially increasing the number of men in the gang ahead of the machines.

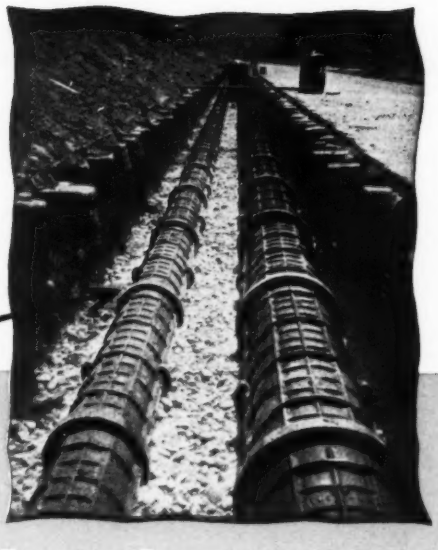
*Fast, efficient and uniform placement of large or medium rock ballast as well as gravel and light ballast. The M-T's are revolutionizing track ballasting methods from the standpoint of low costs, permanence and absolute uniformity of track. No follow-up or smoothing work is necessary.*

**"THE TRACK STAYS PUT!"**

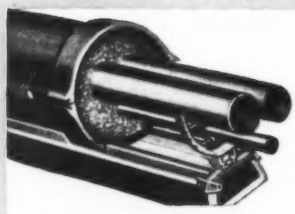
**ELECTRIC TAMPER & EQUIPMENT CO., Ludington, Michigan**

# RIC-WIL Tile and Cast Iron CONDUIT SYSTEMS

***for underground insulated piping***



# geared to the ground load



**Standard Tile**—for all normal ground load conditions.

**Super Tile**—for use under highways and heavy traffic.

**Cast Iron**—for use under or near railroad tracks.

**Ric-wiL Standard Tile, Super Tile and Cast Iron Conduit Systems for steam, hot water, and oil distribution are designed so that all three types are interchangeable—an exclusive feature that permits any combination required to meet varied ground load conditions.**

**These Ric-wiL Systems meet every requirement for maximum protection and efficient insulation of underground pipe lines. Ric-wiL interlocking design and construction assure high strength, permanent alignment and extraordinary tightness in a thermally efficient conduit which can be quickly and economically installed.**

- **Non-settling base drain provides drainage in addition to supporting conduit and pipes.**
- **Correctly-engineered roller-type pipe supports carry the weight of the piping on the base drain.**
- **Tile conduit is scored for easy splitting and re-sealing after pipe and insulation are installed.**
- **Various types of insulation available for hand packing around pipes in conduit.**

**RIC-WIL**

**INSULATED PIPE CONDUIT SYSTEMS**

**THE RIC-WIL COMPANY • CLEVELAND, OHIO**

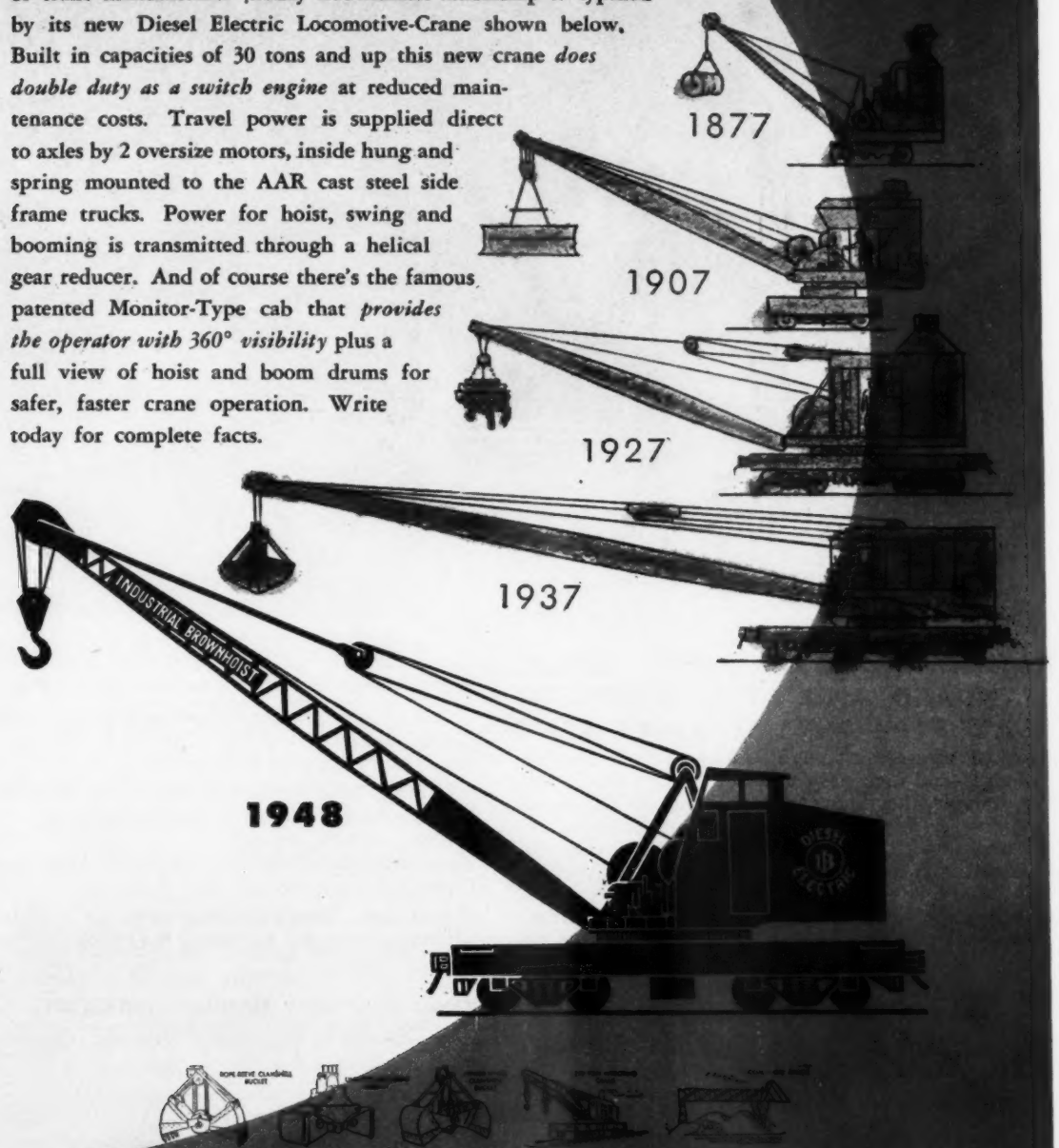
CABLE ADDRESS: RICWIL, BENTLEY'S CODE

**For full information and specifications, Form 4704, write The Ric-wiL Co., Cleveland, Ohio, Dept. 1387**

# BROWNHOIST CRANES

# 1877 1948

**For** seventy years Brownhoist has been foremost in the field of crane manufacture. Today Brownhoist leadership is typified by its new Diesel Electric Locomotive-Crane shown below. Built in capacities of 30 tons and up this new crane *does double duty as a switch engine* at reduced maintenance costs. Travel power is supplied direct to axles by 2 oversize motors, inside hung and spring mounted to the AAR cast steel side frame trucks. Power for hoist, swing and booming is transmitted through a helical gear reducer. And of course there's the famous patented Monitor-Type cab that *provides the operator with 360° visibility* plus a full view of hoist and boom drums for safer, faster crane operation. Write today for complete facts.




**INDUSTRIAL BROWNHOIST CORPORATION • BAY CITY, MICHIGAN**

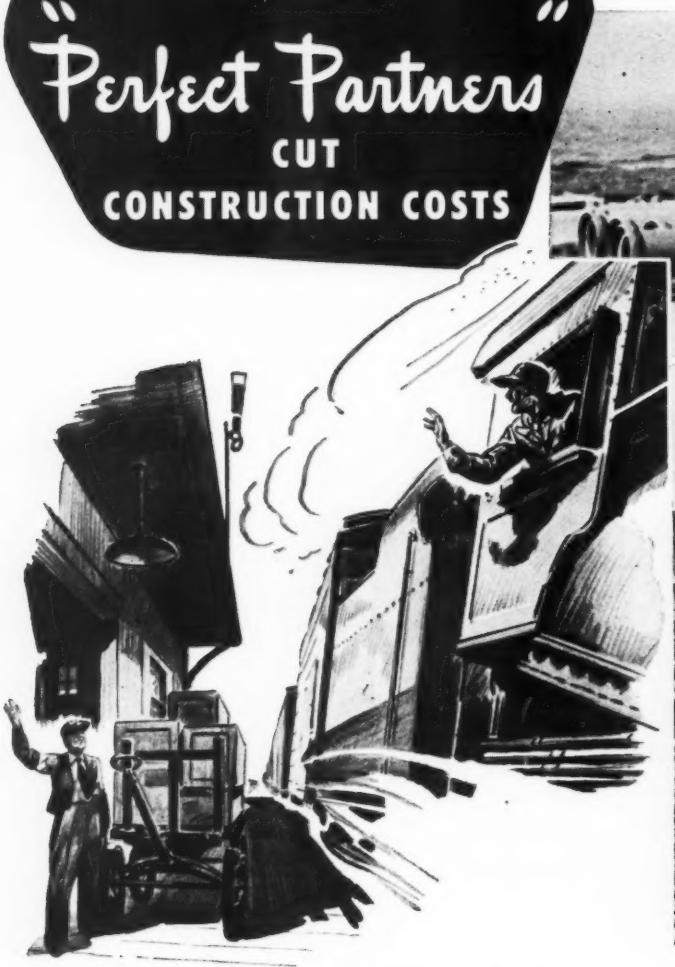
DISTRICT OFFICES: NEW YORK, PHILADELPHIA, CLEVELAND, CHICAGO • AGENCIES: DETROIT, BIRMINGHAM, HOUSTON, LOS ANGELES, PORTLAND, SAN FRANCISCO, SEATTLE, SPOKANE, CANADIAN BROWNHOIST LTD., MONTREAL, QUEBEC

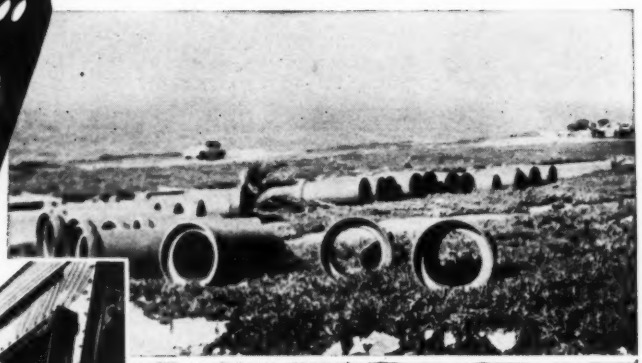
THESE

"Perfect Partners"

CUT

CONSTRUCTION COSTS





## RAILROADS SAVE MONEY USING STANDARD AND EXTRA-STRENGTH CLAY PIPE IN THE SAME LINE

Railroad construction engineers know their roadbed drainage—and their Clay Pipe—from long experience. For example, they know *Standard Strength* and *Extra-Strength* Clay Pipe can be used in the same line to carry the same flow . . . to save money in roadbed, yard and terminal drainage. You use Extra-Strength Clay Pipe only where it is needed to withstand heavy loads. Complete the line with Standard Strength Clay Pipe. Wherever tracks are laid — in shifting sand, in cuts and fills, in swampy lowlands — *everywhere* safe, smooth railroad operation depends on quick, efficient drainage.

Clay Pipe also plays an important role in sewers for shops, terminals, and other railroad buildings. Clay Pipe is the *only* pipe that can *safely* carry all kinds of shop and roundhouse wastes without deteriorating.

Vitrified Clay Pipe cuts drainage costs because it does not rust, corrode, crumble, or disintegrate . . . resists the abrasive action of silt and loose gravel in the line. Clay Pipe *never wears out!*

**If you need specific information on a Clay Pipe problem, write the details to the office nearest you.**

**NATIONAL CLAY PIPE MANUFACTURERS, INC.**

522 First National Bank Bldg., Atlanta 3, Ga.
1105 Hunt'on Bank Bldg., Columbus 15, O.
703 9th & Hill Bldg., Los Angeles 15, Calif.
100 N. LaSalle St., Rm. 2100, Chicago 2, Ill.

C-448-1A

*Vitrified*

CLAY PIPE NEVER WEARS OUT! PIPE



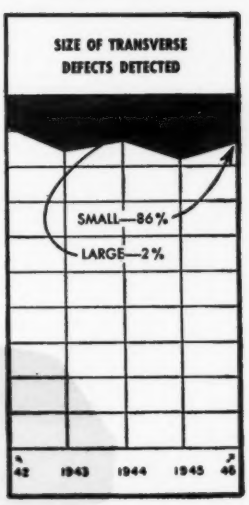
*For additional information, use postcard, pages 739-740*

# 101 RAILROADS
## Use SPERRY RAIL SERVICE Regularly

RAPID GROWTH—A failure in track which grew rapidly under traffic. Fissure grew normally to 14% of the rail head area — then rapid growth (indicated by rings) caused early failure.

## To Find Rail Defects When Small

Proof that Sperry's accuracy increases railroad safety. Consistent results seen in this chart have been obtained with frequent testing.




# WHY
## SMALL DEFECTS ARE IMPORTANT!

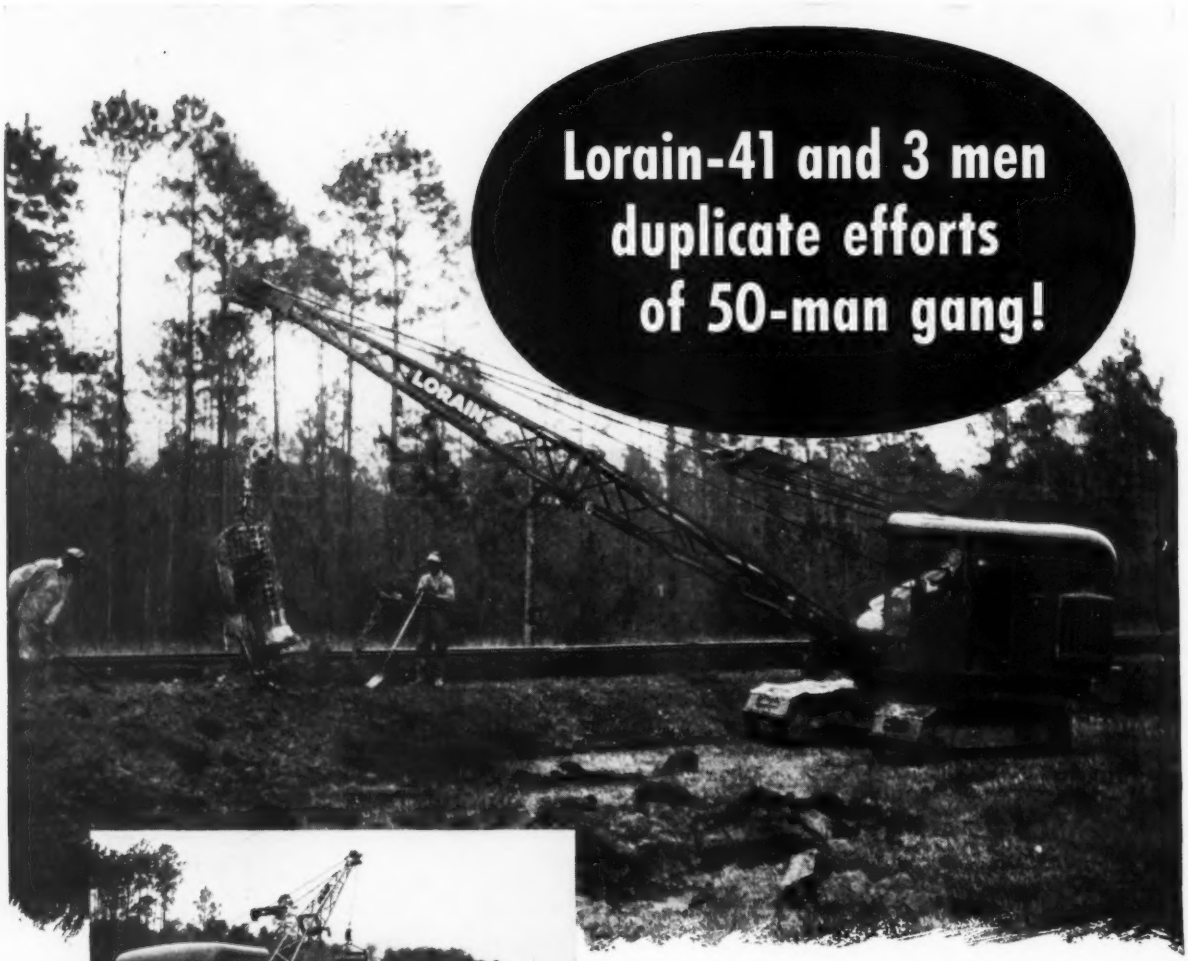
Detection of rail defects when *small* (less than 20% of the cross sectional area of the rail head) is important because:

1. **Small defects have caused serious derailments.**
2. **Small defects have grown rapidly (or suddenly) to a large size—resulting in broken rails.**

*101 Railroads* now test rails in track regularly with Detector Cars operated by Sperry. These roads have the satisfaction of knowing that they use the most efficient method of detecting *hazardous transverse* and *longitudinal* rail defects — that they obtain maximum track safety with Sperry.

Sperry stands ready to make comparative demonstration tests to prove superior detection performance. SP-110

# Lorain-41 and 3 men duplicate efforts of 50-man gang!



YOU don't have to be a mathematician to figure out the economies on this job. This ¾ yd. Lorain-41 dragline of a southern railroad, with the services of one operator and two laborers, completes 540 ft. of ditch, roadbed and finish in one day. Previously it took a 50-man gang one day to do the same amount of work.

Mechanizing of such material handling operations is one effective way of combating rising costs. The Lorain line of shovels and cranes offers a size and type to fit every phase of your construction and maintenance program. Capacities range from ½ yd. up. Units in the ½ and ¾ yd. classes offer a choice of crawler and rubber-tire mountings, permitting you to select the degree of mobility suited to your operations.

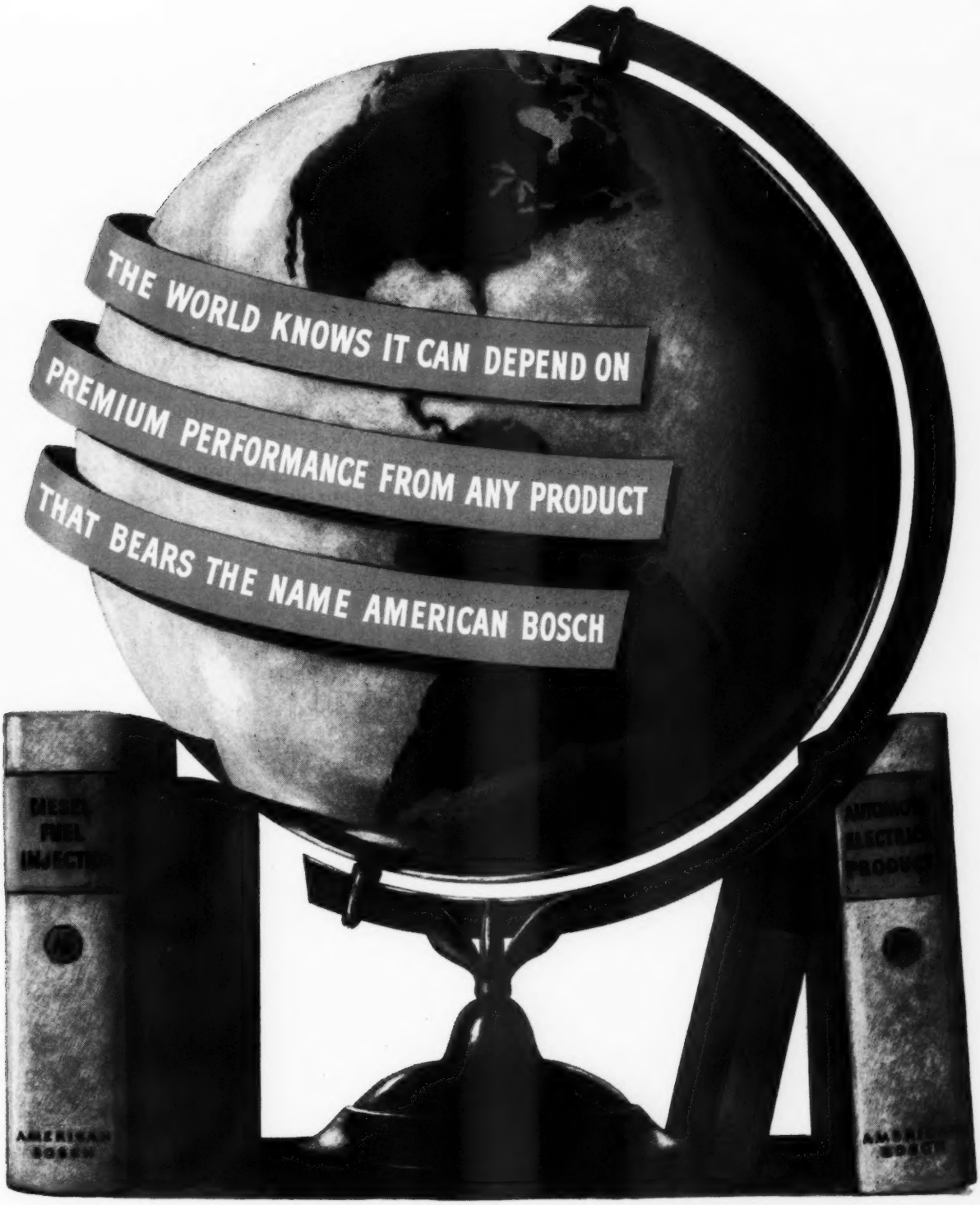
Complete information on all Lorain shovels and cranes can be obtained from your local Thew-Lorain distributor. He will be glad to help you get more mileage out of your construction and maintenance dollars.

thew · Lorain®

THE THEW SHOVEL CO.
LORAIN, OHIO

CRANES · SHOVELS · DRAGLINES · MOTO-CRANES


*For additional information, use postcard, pages 739-740*




# American Bosch

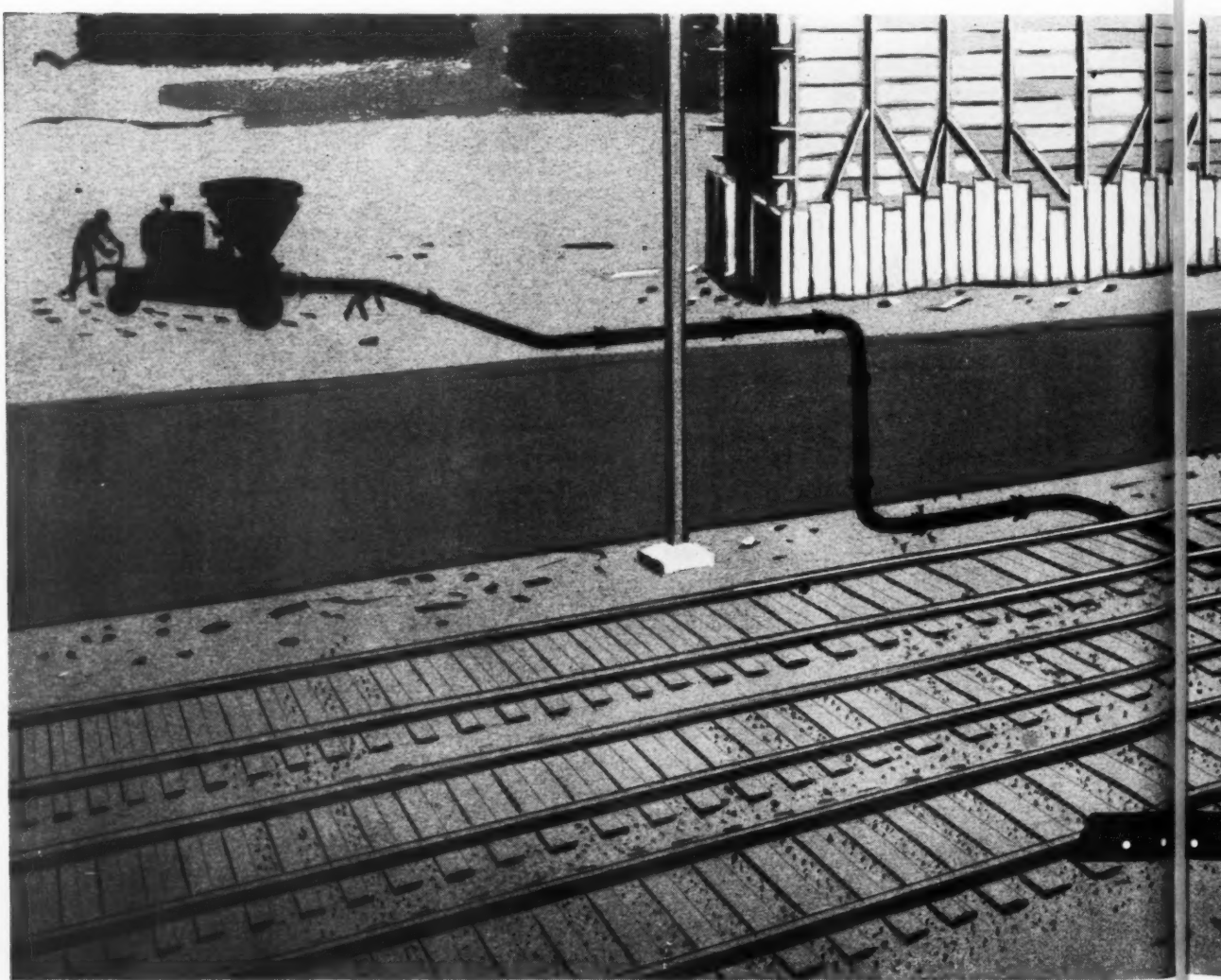
**Factory in Springfield, Massachusetts • Service the Whole World Over**

# How to place concrete...

Rex Pumpcrete, *the pump that pumps concrete through a pipe line,* makes it easy to place concrete on your construction and maintenance jobs without disrupting rail traffic! Note the illustration below. Sketched from an actual application, it illustrates how Pumpcrete and pipe line placement were used to place concrete for the forms of an overpass over the main line and service tracks of a number of railroads leading into a large city.

The Pumpcrete was located well off the right-of-way and the pipe line ran under and alongside the tracks to the forms. No chance here to interfere with rolling stock and disrupt schedules. Add to this the fact that Pumpcrete delivers concrete without segregation, assuring the highest quality . . . highest strength concrete of any placement method.

Overpasses, underpasses, culverts, bridges, warehouses, stations, docks are but a few of many jobs Pumpcrete is doing for railroads. It's the efficient way to place concrete . . . *fastest, lowest cost.*

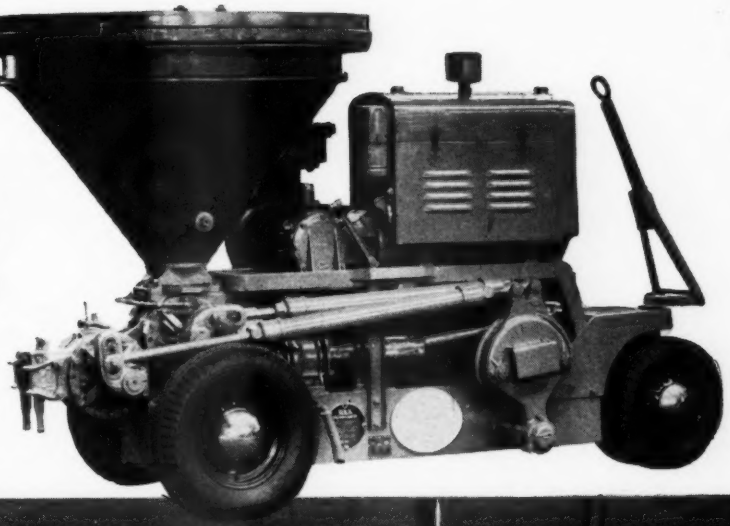


# ..without disrupting traffic!

# REX PUMPCRETE

**(SYSTEM KOOYMAN)**

*For all the facts on Pumpcrete, send for your copy of Bulletin No. 47-25. Address Chain Belt Company, 1601 West Bruce Street, Milwaukee 4, Wis.*



BEALL Hi-Duty SPRING WASHERS are made especially to stand the strain of the heavy-duty rail service required by today's high-speed freight and passenger trains.

These washers are strong and tough, yet provide the necessary "springing action" required at rail joints, frogs and crossings.

We control every step of their manufacture—from the specification of the specially-developed formula and process used in making the steel to the forming, hardening, tempering and testing operations.

**BEALL TOOL DIVISION** *of Hubbard* **& Co.**
**EAST ALTON, ILL.**

**Specialist Manufacturers of Spring Washers**

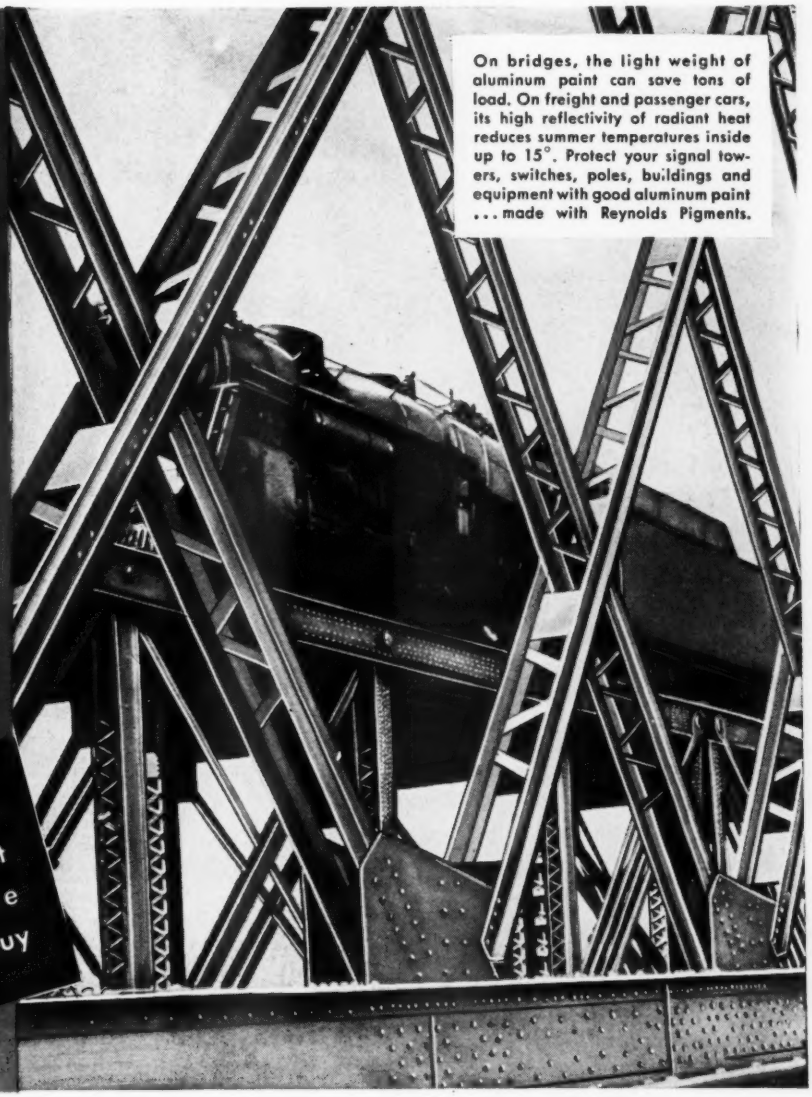
**BEALL Hi-Duty SPRING WASHERS**
MADE ESPECIALLY FOR RAILROAD SERVICE

● Fast driving SKIL Drills have the extra power that makes tough drilling easy for section gangs and maintenance crews. They save time and money building bridges, platforms, towers, sheds. They speed drilling and reaming in heavy steel. They sink lead holes *fast* for quick setting of screw spikes. SKIL Drills turn out precision work even in cramped quarters . . . because they're so compact, so easy to handle. 26 models with capacities up to 7/8 inch diam. in steel. Ask your SKIL Tool Distributor to demonstrate the *right* SKIL Drill *right on the job!*

**SKILSAW, INC.**
**5033 Elston Avenue, Chicago 30, Ill.**
*Factory Branches in Principal Cities*
*In Canada:* SKILTOOLS, LTD., 66 Portland St. Toronto, Ont.

**SKIL** ELECTRIC **Tools** PNEUMATIC
TRADE-MARK

# PROTECT IT WITH * GOOD ALUMINUM PAINT



On bridges, the light weight of aluminum paint can save tons of load. On freight and passenger cars, its high reflectivity of radiant heat reduces summer temperatures inside up to 15°. Protect your signal towers, switches, poles, buildings and equipment with good aluminum paint ... made with Reynolds Pigments.

* Here are 2 checks to make sure you get top quality in the aluminum paint you buy

THERE'S no better, longer lasting or more economical "lifeguard" for your property than good aluminum paint. It protects metal from rust and corrosion... brightens and beautifies all it covers ...assures lower maintenance costs.

Your first check on the quality of aluminum paint is to see that it is made by a reliable manufacturer; your second is to ask whose pigment is used. If it's Reynolds pigment, that's the very foundation of quality.

Reynolds has been leader in aluminum pigment production for a quarter-century. No one knows better how to produce pure pigments... of proper characteristics for every use. And the long association of Reynolds with the paint industry... the close collaboration between paint chemists and Reynolds technicians... is additional assurance of the best in aluminum paint.

When you buy a good brand of aluminum paint, chances are it will be made with Reynolds Pigments. But it will pay you to check back and make sure. For when it's made with Reynolds Pigments, it's more than paint—it's *Liquid Aluminum*.

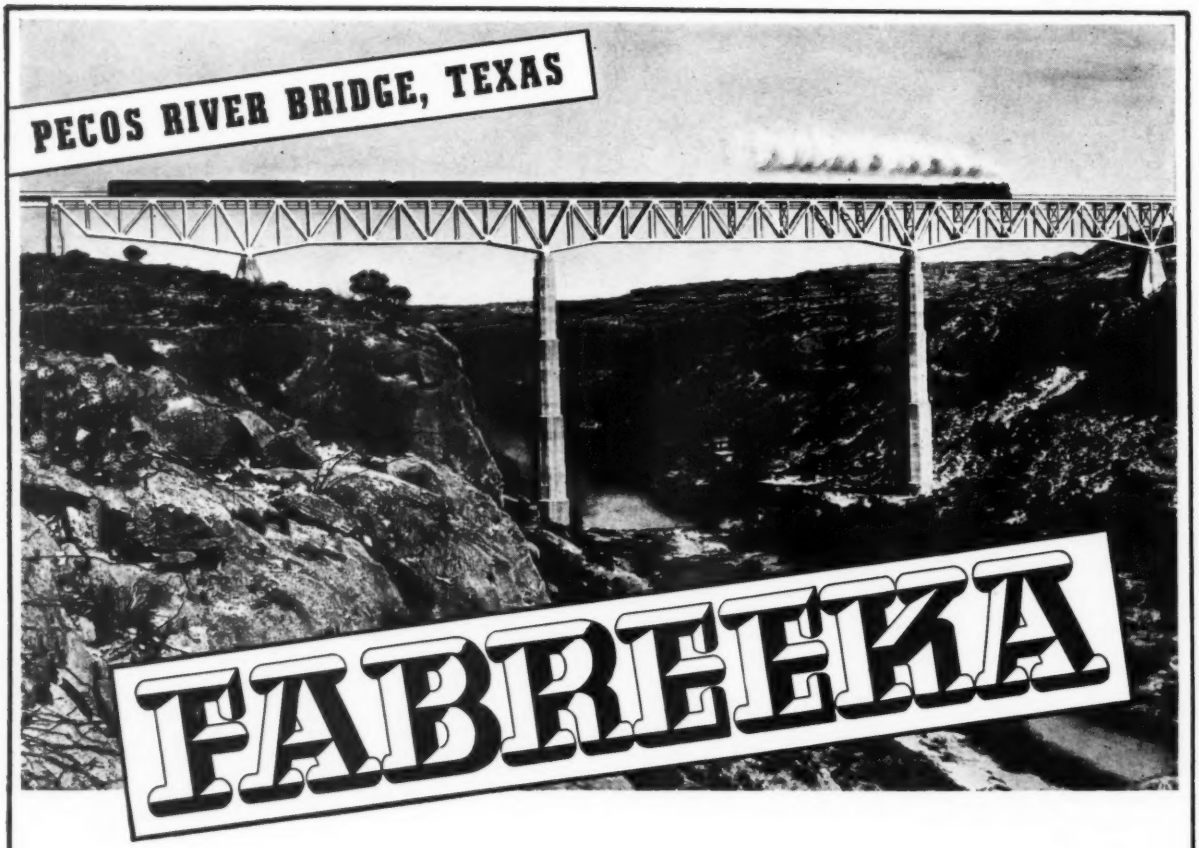
Reynolds Metals Co., Pigment Division,
19 East 47th Street, New York 17, N. Y.

REYNOLDS METALS

IT'S MORE THAN PAINT ... IT'S

REYNOLDS ALUMINUM PIGMENTS

LIQUID ALUMINUM




On the Pecos River Bridge of the Texas and New Orleans Railroad, Fabreeka is used between the tie plates and the steel deck to protect the bridge structure by absorbing impact shock and vibration and to provide the necessary insulation for the signal system.

On the Southern Pacific Company train shown on the bridge, Fabreeka is also used in the cars to absorb impact shock, vibration, noise and to reduce mechanical wear.

This illustrates the type of service so well provided by Fabreeka during the past 15 years in both mechanical and track departments of the railroads.

*It Pays to Specify Fabreeka*

*Used in* RAILWAY PASSENGER CARS, Trucks and Platforms . . . LOCOMOTIVES, Steam and Diesel Electric . . . TRACK CONSTRUCTION, on Bridges, Crossings, Curves, Turntables and Track Scales.

FABREEKA PRODUCTS COMPANY, INCORPORATED
Boston 10, Mass.

✓ EASY ON THE OPERATOR

✓ EASY TO HANDLE AND SPOT

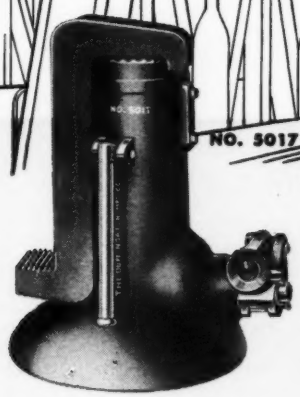
✓ SAFE AND DEPENDABLE

THAT'S WHY

# DUFF-NORTON JACKS

ARE BEST FOR

## *Bridge Construction and Maintenance*



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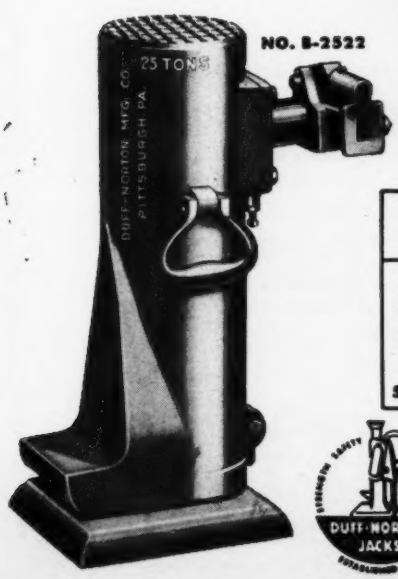
NO. 5010-C-2




NO. B-2522

Built for rough outdoor service, Duff-Norton Jacks require a minimum of effort in lifting or lowering heavy beams, rigging, heavy machinery and equipment used on bridge construction and maintenance jobs—due to leverage, ball bearing action and accurately machined parts.

**JACK ADJUSTMENT CONTROLLED TO WITHIN A FRACTION OF AN INCH**

Heavy loads are supported for long periods of time without danger of creeping or settling—with precision adjustment control. Write today for descriptive catalog.

***There's a Duff-Norton Jack for every need.***

**QUICK REFERENCE GUIDE FOR BRIDGE JACKS YOU NEED**

| Jack No. | Capacity Tons | Height Inches | Raise Inches | Base Inches | Head Diam. Inches | Foot Lift Ht. Inches | Weight Pounds |
|---|---|---|---|---|---|---|---|
| 915 | 15 | 14¾ | 9 | 6 x 7½ | 3½ | — | 42 |
| B-1522 | 15 | 22 | 10 | 7½ x 9¾ | 4¾ | 3½ | 112 |
| B-2522 | 25 | 22 | 10¼ | 8 x 9¾ | 5¾ | 3¾ | 142 |
| B-3526 | 35 | 26 | 14 | 9 x 10½ | 6¼ | 3¾ | 208 |
| B-5024 | 50 | 24 | 10¾ | 14 diam. | 10¼ | 5¼ | 270 |
| 5017 | 50 | 16½ | 7 | 14 | 5½ | 5 | 195 |
| 5010-C-2 | 50 | 10 | 4½ | 7⅛ | 4 | — | 64 |

**THE DUFF-NORTON MANUFACTURING CO.**

*The House that Jacks Built* • PITTSBURGH 30, PA.

**THE WORLD'S OLDEST AND LARGEST MANUFACTURER OF LIFTING JACKS**

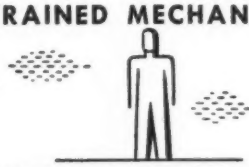
# EXTERIOR MAINTENANCE IS ONE OF *YOUR* PROBLEMS

## WESTERN OFFERS AN *EFFECTIVE* SOLUTION WITH COMPLETE WEATHERPROOFING SERVICE

### TESTED METHODS . . . To Save You Thousands of Dollars Annually

Western engineers, versed in grain bin construction, are readily able to recognize causes of deterioration — and to recommend proper methods of concrete restoration.

### TRAINED MECHANICS . . . . . To Skillfully Treat Your Property



Western technicians, experienced in restoration of disintegrated concrete, utilize the know-how gained by 35 years successful weatherproofing. May we show you the caliber of their work on a job near you?

### SUPERIOR MATERIALS . . . . To Increase the Life of Your Buildings

Western materials, compounded in the laboratory, have proven their advantages by years of successful application. Double effective, they decorate as well as weatherproof your bins.

Western's best testimonial is its record of *proven* performance — at a cost which is quickly liquidated in maintenance savings and many extra years of use. You cannot afford to neglect *your* exterior maintenance problem — your property deserves Western's attention. Write today for further information.

*Let us be your Concrete Dentist!*

**WESTERN**
**WATERPROOFING COMPANY**
*Engineers and Contractors*
SYNDICATE TRUST BLDG. • ST. LOUIS 1, MO.
KANSAS CITY, MO. • SPRINGFIELD, ILL. • ATLANTA, GA. CHARLOTTE, N. C.

# A NEW APPROACH to Construction Problems

Off-the-track power is a new approach to railway construction problems. Here's an example of International Power setting the pace.

Dirt was hauled by car to the scene and spread by an International TD-9 Crawler. This compact but powerful tractor handled 50,000 cubic yards of earth while building new bridge approaches — one 1200 feet long, the other 700 feet in length. And the track was kept clear!

This is typical of the jobs International Crawlers are doing all over the country. They add a potent factor—dependable, off-the-track power—to railroad construction and maintenance forces. They mean greater efficiency, lowered costs and a minimum of interference with normal track operations.

Consult your International Industrial Power Distributor. He'll show you how International Power will give you a new, efficient approach to your construction and maintenance problems.

*Listen to "Harvest of Stars" every Wednesday on your CBS Station*

INTERNATIONAL HARVESTER

*Industrial Power Division*

**INTERNATIONAL HARVESTER COMPANY**

180 North Michigan Avenue Chicago 1, Illinois

**INTERNATIONAL *Industrial* POWER**

**CRAWLER TRACTORS • WHEEL TRACTORS DIESEL ENGINES • POWER UNITS**

# THE American DIESELECTRIC

## *A Revolutionary New Locomotive Crane!*

By the ingenious, patented use of direct-diesel power to the deck and electric power to the trucks, this remarkable new crane has upset all concepts of operating costs. Upkeep expense is reduced not by hundreds of dollars, but *thousands*. "Down" time for shop repairs is correspondingly less. And the work output of the new DIESELECTRIC is truly sensational.

May we send you a catalog, with full details? Just mail the coupon below.

## HIGH SPEED *"Live-Boom" Action*

**CREATED BY NEW, IMPROVED BOOM HOIST**

* * *

● A remarkable new boom hoist mechanism brings *live-boom* action to the DIESELECTRIC. On old style cranes with jaw clutch boom hoists, the boom radius was seldom changed in operation. But here the operator has a smooth, air-controlled *friction* clutch . . . fast spur gear drive, instead of slow, inefficient worm drive . . . and a safe, efficient foot brake *plus controlled lowering speed*. He swings the boom up or down in 45 seconds. This motion is *simultaneous* with hoisting, slewing or traveling. Result: INCREASED WORK OUTPUT!

**American Hoist**
**and DERRICK COMPANY**
St. Paul 1, Minnesota
*Plant No. 2:* So. Kearny, N.J.
*Sales Offices:* PITTSBURGH • SAN FRANCISCO
CHICAGO • NEW YORK • NEW ORLEANS

**AMERICAN HOIST**
**and DERRICK COMPANY**
**St. Paul 1, Minnesota**

Please send your Catalog No. 600-L-4, describing the American DIESELECTRIC Locomotive Crane.

Name_____

Company_____

Address_____

City_____ State_____

8604

# HOW TO KEEP ON THE TRACK OF TRACK TROUBLE

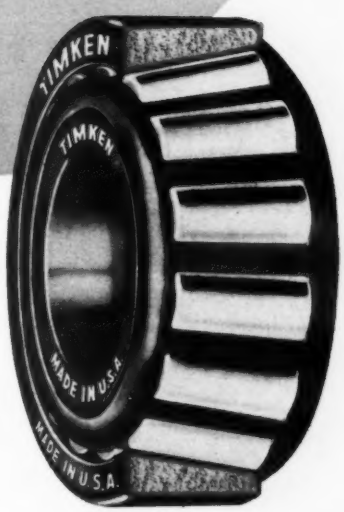
*Fairbanks-Morse No. 53-D motor car with all axles on Timken bearings.*

Friction bearing disabilities can stop the mighty locomotive and the humble section car alike. That's why both now are standardized on Timken roller bearings.

Timken bearings have the smoothness of friction-free operation; the radial, thrust and combined load capacity of Timken tapered design; the tremendous strength and shock resistance of Timken fine alloy steel.

In railway motor cars and trailers they specifically preserve wheel gauge and prevent wear on axles in addition to their other advantages.

Make sure Timken roller bearings are used in the section cars you buy. Look for the trade-mark "TIMKEN" on every bearing that goes in the cars you build.




**THE TIMKEN ROLLER BEARING COMPANY, CANTON 6, OHIO**
**CABLE ADDRESS "TIMROSCO"**

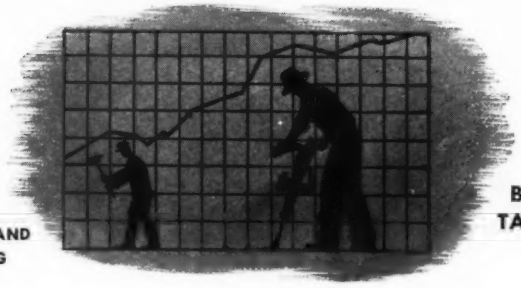
**TIMKEN**
TRADE-MARK REG. U. S. PAT. OFF.
***TAPERED ROLLER BEARINGS***

**NOT JUST A BALL ◯ NOT JUST A ROLLER ⬭ THE TIMKEN TAPERED ROLLER ⬭ BEARING TAKES RADIAL ◫ AND THRUST →◫← LOADS OR ANY COMBINATION ✳**

# More and Better Tamping for Less Money

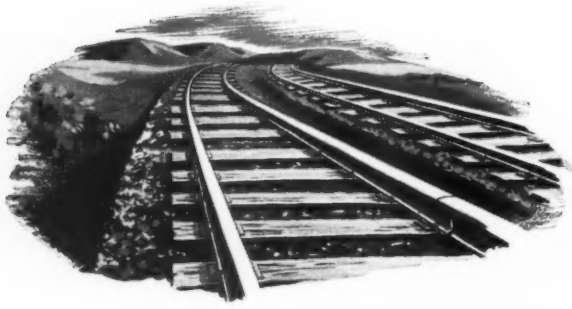
## with BARCO

**It doubles a man's output . . .**



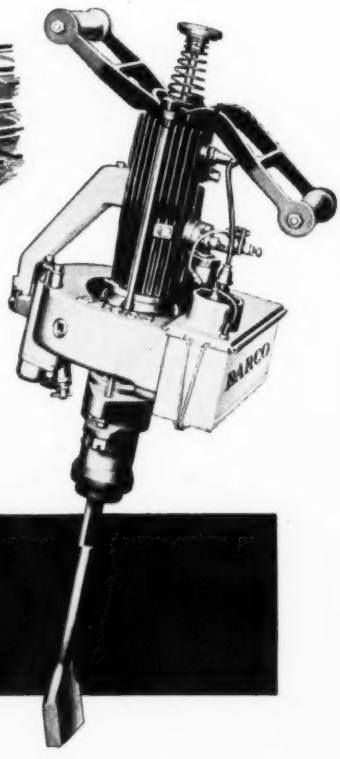
BAR OR HAND TAMPING

BARCO TAMPING



**Does more uniform and lasting work . . .**

**Is used not only for spot tamping but can be bunched for out-of-face surfacing**




Light in weight and correctly balanced, the Barco is self-contained, providing easy portability on busy right-of-ways, eliminates need to remove ballast between the ties. As speeds increase and loads grow heavier, more and more railroads depend on Barco as their most efficient tamping tool. For more detailed information, write to Barco Manufacturing Company, 1805 Winnemac Ave., Chicago 40, Ill. In Canada: The Holden Co., Ltd., Montreal, Canada.

**BARCO UNIT TYTAMPERS**

**Free Enterprise—the Cornerstone of American Prosperity**

# ..SERVING..BY Saving

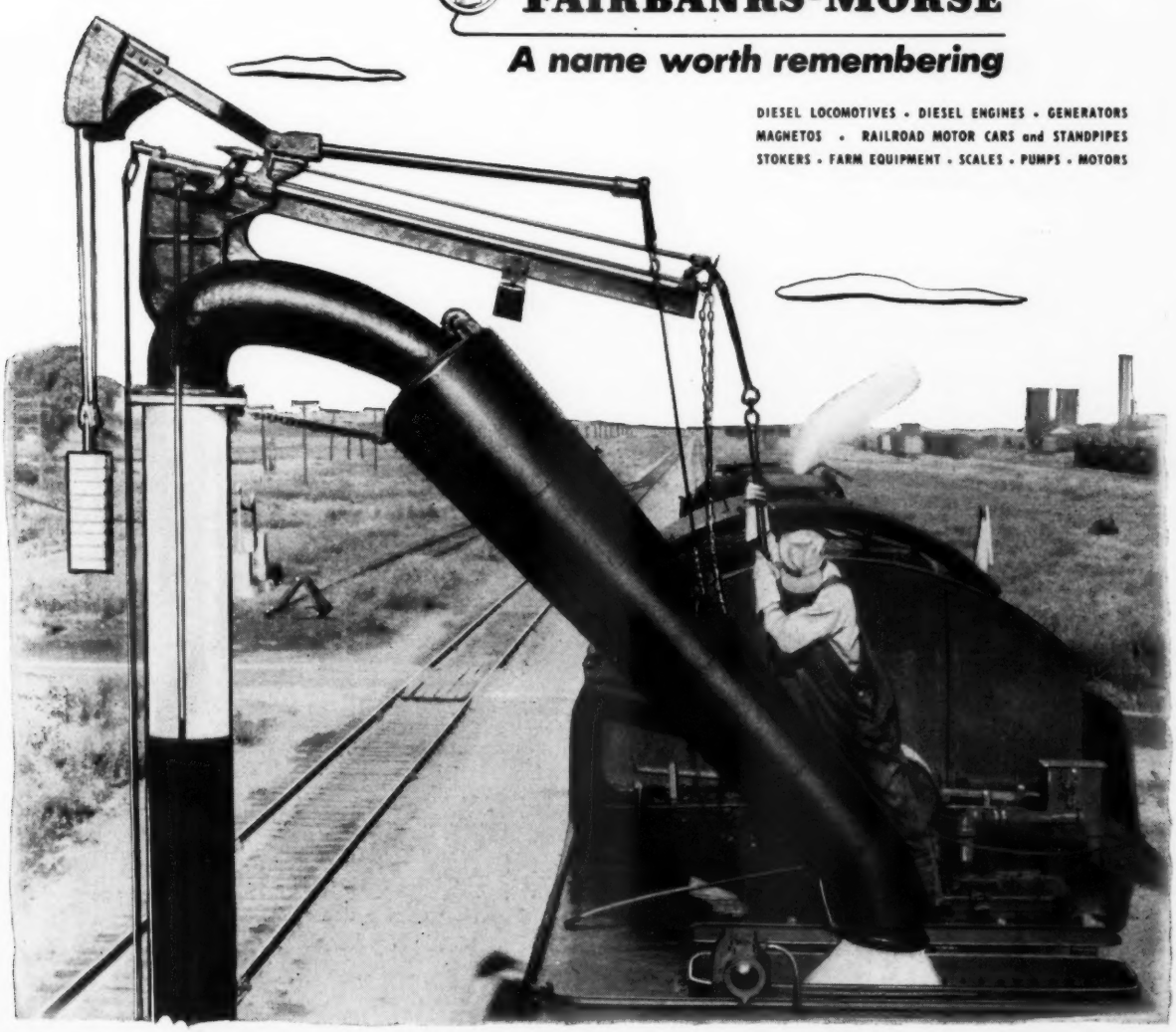
Fairbanks-Morse, today as in the past, is serving the railroads of the nation with a long line of railroad equipment designed and built by men who have "grown up with the roads"—equipment that saves time, manpower and maintenance dollars wherever it is used.

That's why Fairbanks-Morse is a primary source for oil and water standpipes, coal and sanding stations for diesel and steam locomotives, cinder conveyors, railroad scales, pumps, motor cars—and other primary equipment. Fairbanks, Morse & Co., Chicago 5, Ill.

**FAIRBANKS-MORSE**

***A name worth remembering***

DIESEL LOCOMOTIVES • DIESEL ENGINES • GENERATORS
MAGNETOS • RAILROAD MOTOR CARS and STANDPIPES
STOKERS • FARM EQUIPMENT • SCALES • PUMPS • MOTORS



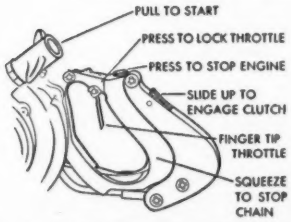
# NEW! DISSTON
## ONE-MAN CHAIN SAW
### with Mercury Gasoline Engine

Patents Pending

## SERVICE PROVEN . . .
### A time and money saver

**Use it for light felling and bucking, for limbing, and construction timber cutting.**

**CENTRALIZED CONTROL**




Here's a ONE-MAN Chain Saw with everything you could ask for. It has extra power and cutting speed. It's compact, well-balanced, light in weight. It's safe and easy to handle, simple to operate. Delivers full power with saw held at any angle . . . engine operates equally well upside down or in any position. Will stand up long in hard, steady work. It bears the Disston name . . . carries the Disston guarantee . . . your assurance of top quality in every detail.

### RUGGEDLY BUILT FOR TROUBLE-FREE SERVICE

Use the Disston ONE-MAN Chain Saw on any kind of cutting within its 18" capacity. You'll say, as so many others are saying, "It's a real engineering achievement." Examine its special features. 2-cycle, 3½ h.p. at 4000 r.p.m., air-cooled engine with precision built anti-friction bearings on all rotating parts. Fuel meter gives automatic fuel feed and also acts as engine speed governor. Built-in Automatic Chain Lubricator. Crankshaft type magneto, doubly protected against dirt and moisture.

Clutch is positive, quick acting, manually controlled. Guide Rail and cutting chain of Disston Steel, hardened and tempered. Chain fully interlocked . . . won't buckle. Replaceable air cleaner and fuel filter. Magnapull starter. All these and many other features combine to give you a ONE-MAN Chain Saw you can count on for dependable performance under all operating conditions.

ESTABLISHED 1840
REG. U.S. PAT. OFF.

When you buy a Disston product . . .
You buy Disston Steel, Skill and Service.

***Write today for further particulars***

Notching for felling. Note perfect balance because of design and position of handle.

## HENRY DISSTON & SONS, INC., 741 Tacony, Philadelphia 35, Pa., U. S. A.

*Canadian Factory:* 2-20 Fraser Ave., Toronto 1, Ont.



*For additional information, use postcard, pages 739-740*

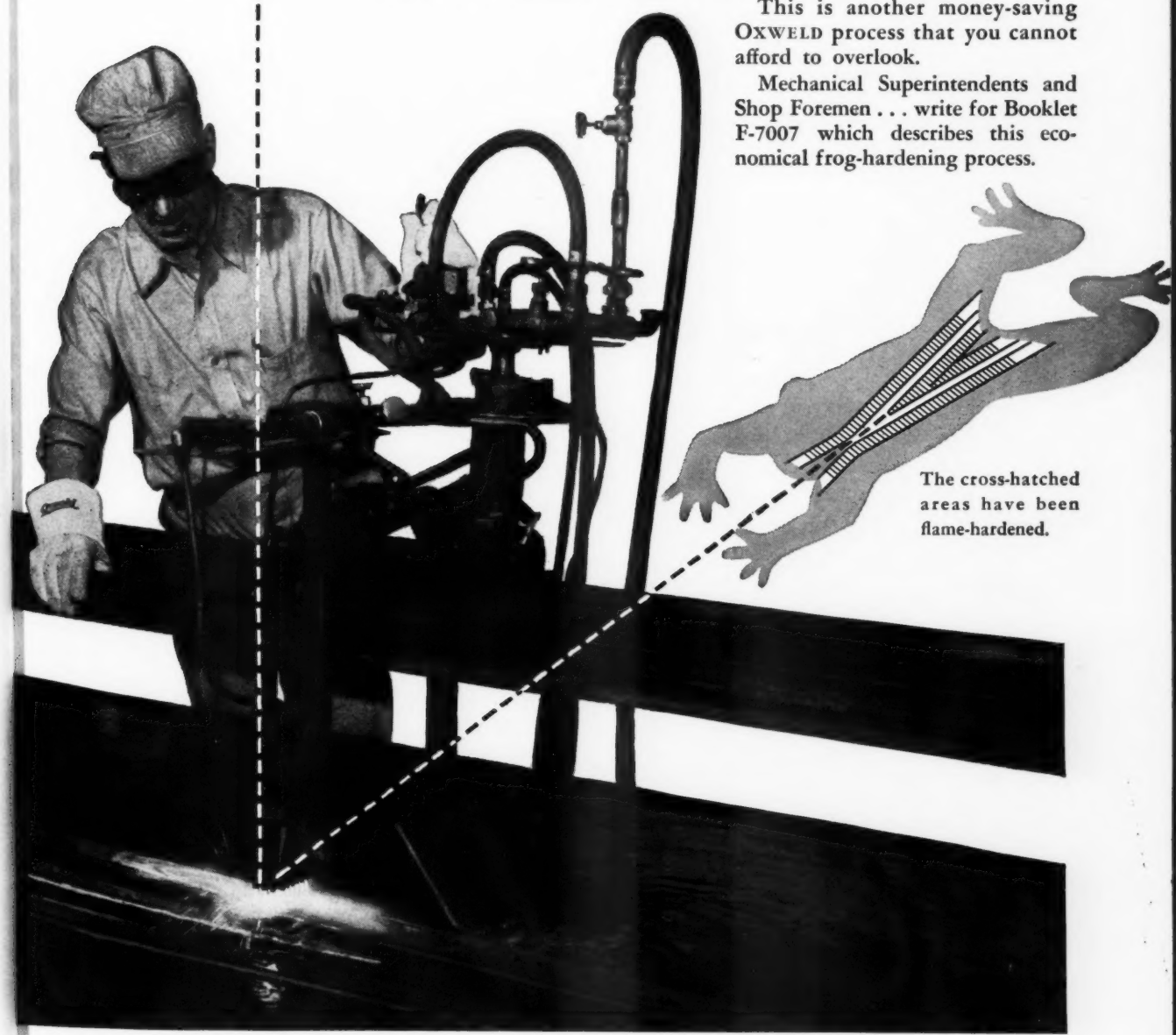
# FROGS can have 9 lives too

When carbon steel frogs are oxy-acetylene flame-hardened, their running surfaces will last up to nine times as long as untreated frogs.

This recently developed OXWELD method is simple and economical. A single multiflame heating head is used—no extra heating is required to draw or temper the hardened areas, and no special coolants are needed. Treated surfaces have uniform hardness values, correct hardness depth.

This is another money-saving OXWELD process that you cannot afford to overlook.

Mechanical Superintendents and Shop Foremen . . . write for Booklet F-7007 which describes this economical frog-hardening process.



The cross-hatched areas have been flame-hardened.

This flame-hardening blowpipe is mounted on a standard OXWELD CM-16 cutting machine.

**THE OXWELD RAILROAD SERVICE COMPANY**
*Unit of Union Carbide and Carbon Corporation*

UCC

Carbide and Carbon Building Chicago and New York

In Canada:
Canadian Railroad Service Company, Limited, Toronto

The word "Oxweld" is a registered trade-mark.

OXWELD RAILROAD SERVICE

P-21650

SINCE 1912—THE COMPLETE OXY-ACETYLENE SERVICE FOR AMERICAN RAILROADS

# THIS DISASTROUS *Fire* COULD *have been* PREVENTED!

A buckled rail caused by the burning timbers below.

## *The* LIBBEY-ZONE TREATMENT *would have saved this bridge!*

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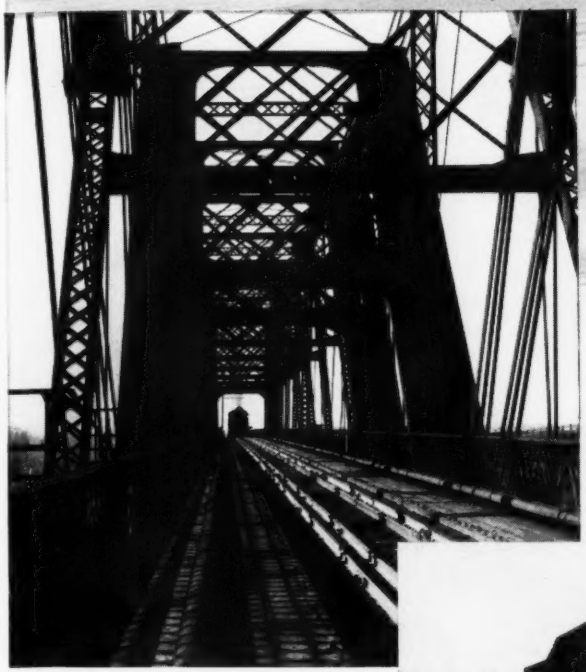

Two views of the Frisco Railroad's bridge at Memphis, Tenn., soon after it had been painted with Pittsburgh IRONHIDE.

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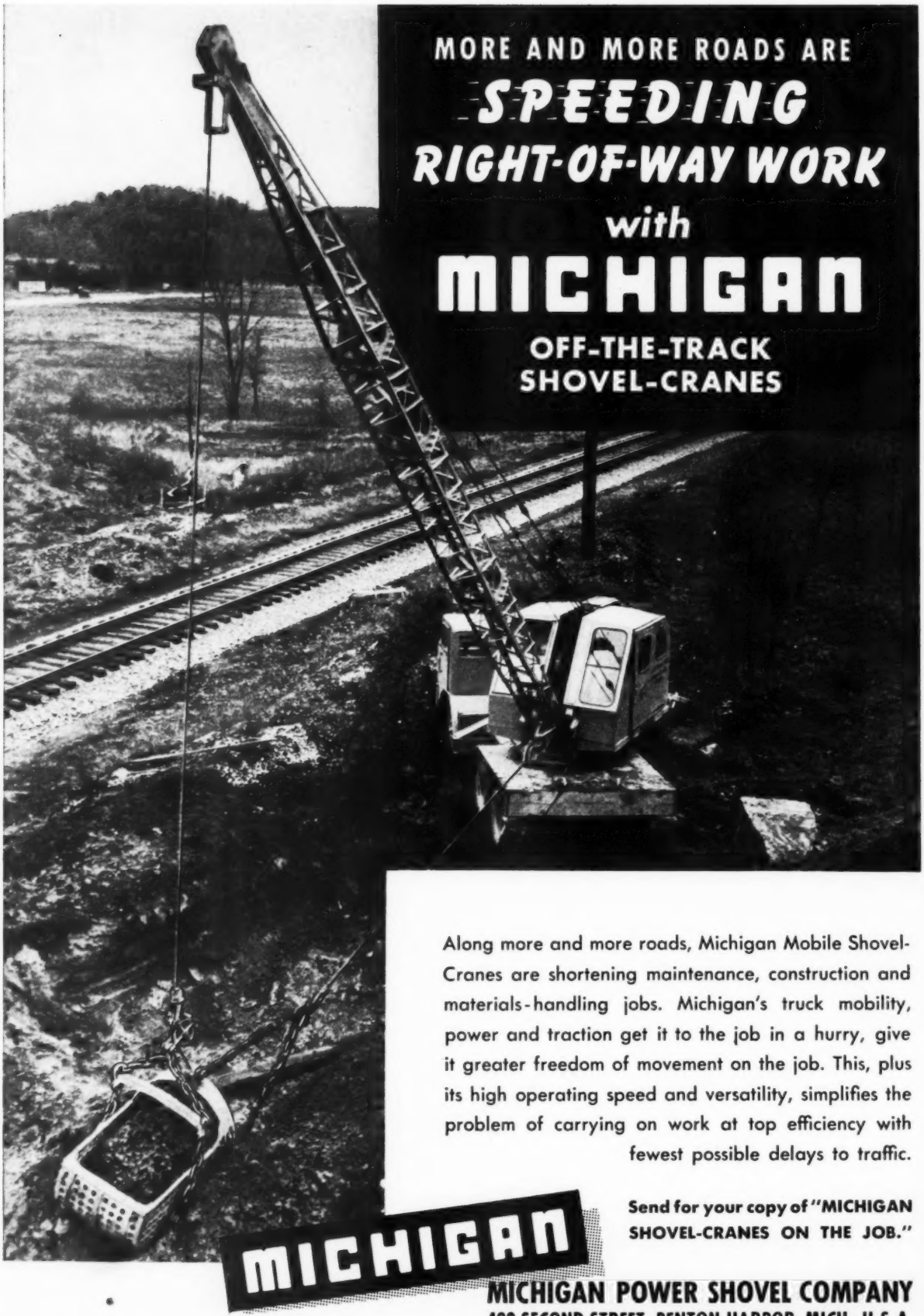
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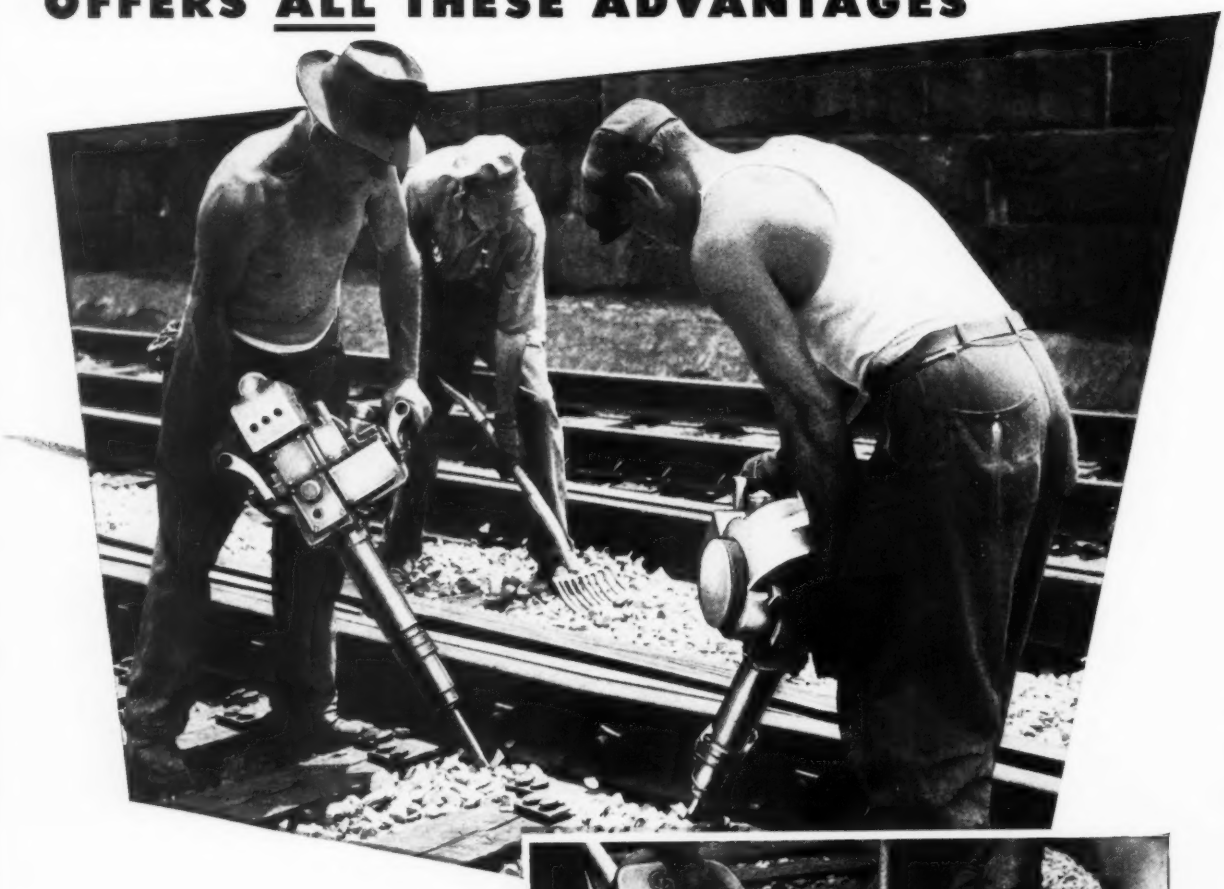

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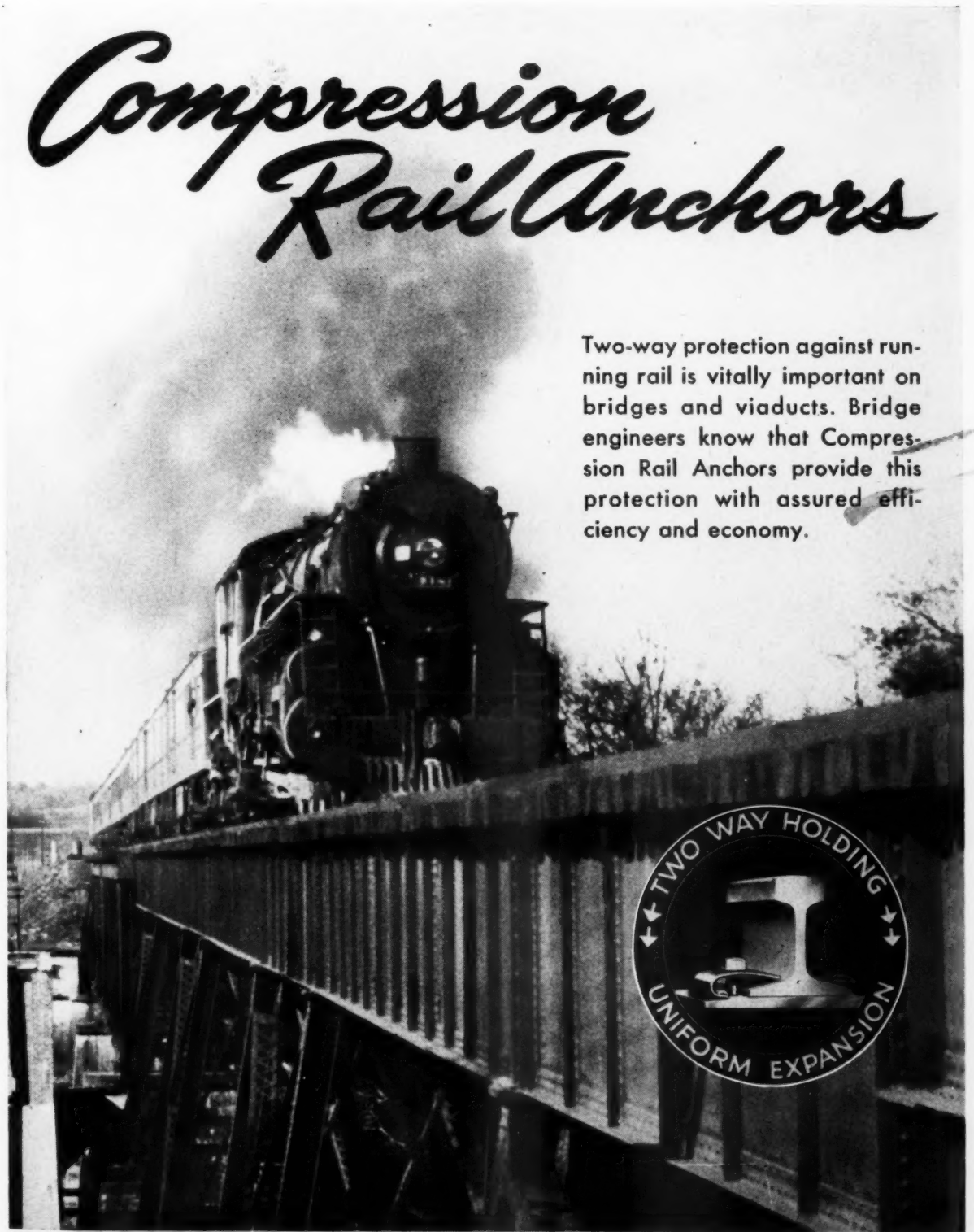


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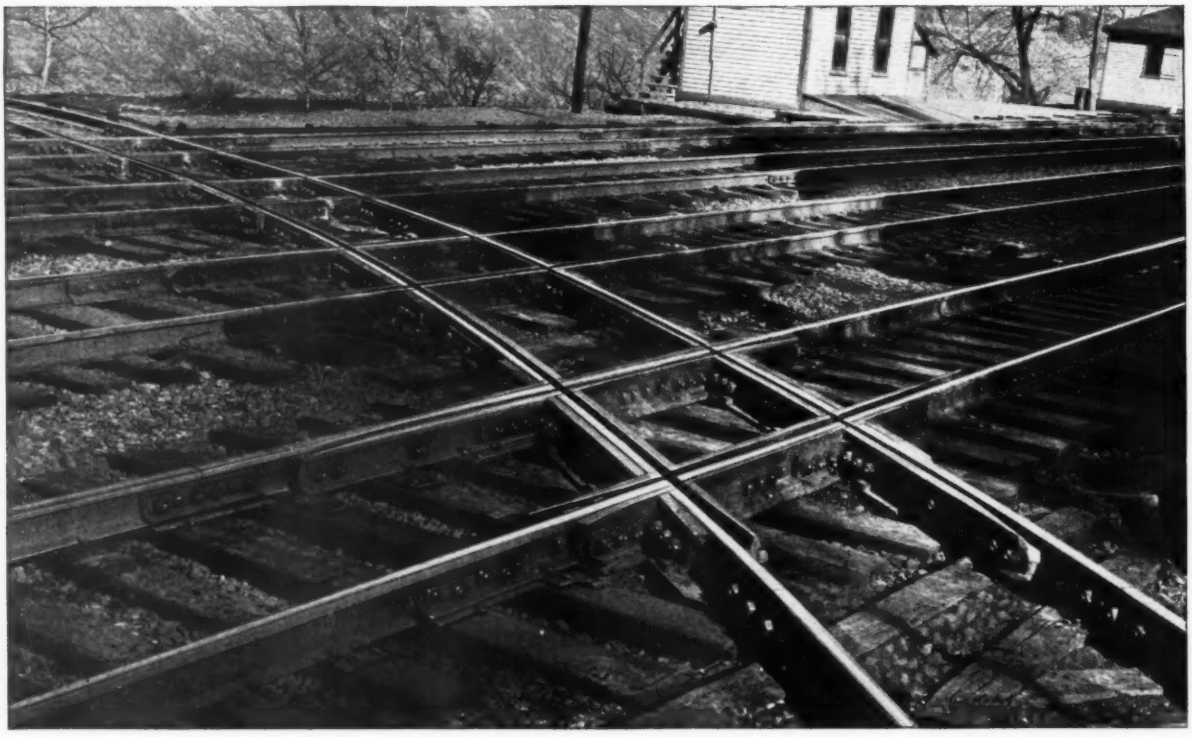

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No. 235 of a Series

Railway
Engineering and Maintenance
SIMMONS-BOARDMAN PUBLISHING CORPORATION

105 WEST ADAMS ST.
CHICAGO 3, ILL.

**Subject:** A Real Opportunity

July 1, 1948

Dear Readers:

The American Railway Engineering Association, under the guidance of a Membership Development committee, is conducting an intensive drive for new members. If you are not already a member of this outstanding group, and are eligible to join, there are compelling reasons—in your own interest—why you should take advantage of this opportunity.

As you undoubtedly know, the association, under the slogan "A Past of Achievement—A Future of Opportunity," is currently commemorating its semi-centennial year—with elaborate plans under way for the fitting culmination of its first 50 years of activity at the time of its annual meeting next March. Are you in on all this? More important, will you be in on the "Future of Opportunity" with the association that lies ahead?

No association, either on or off the railroads, ever had better cause or greater justification to commemorate—even celebrate—its past achievements, and it is to be hoped that the events of the year will be such as to bring pride to its members and a fuller recognition of the achievements of the association by both those within and outside the railroad industry. But still more important is that part of the year's plans that looks to a future for the association that will continue to be a source of pride to members, and that will command still greater appreciation and respect from all other quarters.

The current drive for new members is part of the plan for that more abundant future—abundant in its contribution to every phase of railway construction, operation and maintenance, and abundant in its contribution to the knowledge, welfare and satisfaction of those railway officers who will contribute and partake. It is a part of the plan because it is fully realized that the greatest achievements, and thus the greatest good for the greatest number, can come only through the greatest participation of railway men in the association's activities and benefits.

For those of you who are not members of the A.R.E.A., and who can qualify by training and experience to become members, this appeal for new members, if acted upon, may well be an important turning point. You may have missed having a part in the "past achievements" of the association, but you still have a chance to get in on the "future of opportunity."

May I suggest that you think this over seriously and discuss it with your associates and superior officers, if necessary. If you want further information or a membership application blank, I know that Fred S. Schwinn, assistant chief engineer, Missouri Pacific Lines, at Houston, Tex., who is chairman of the Membership Development committee, or Walter S. Lacher, secretary of the association, at 59 E. Van Buren St., Chicago, will be happy to cooperate with you.

Sincerely,

Neal D. Howard

NDH:ag

Editor

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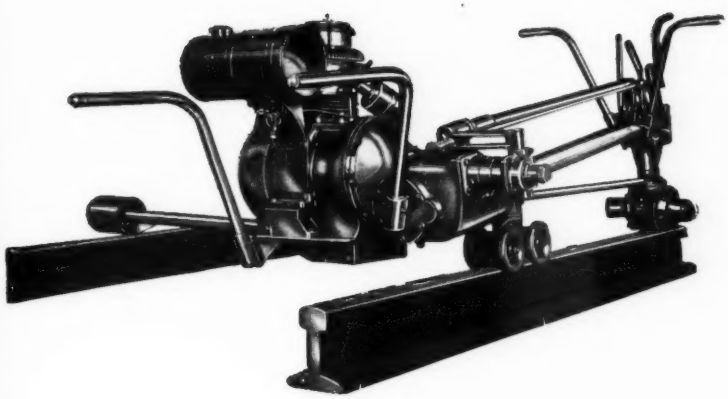
Designed for Safety



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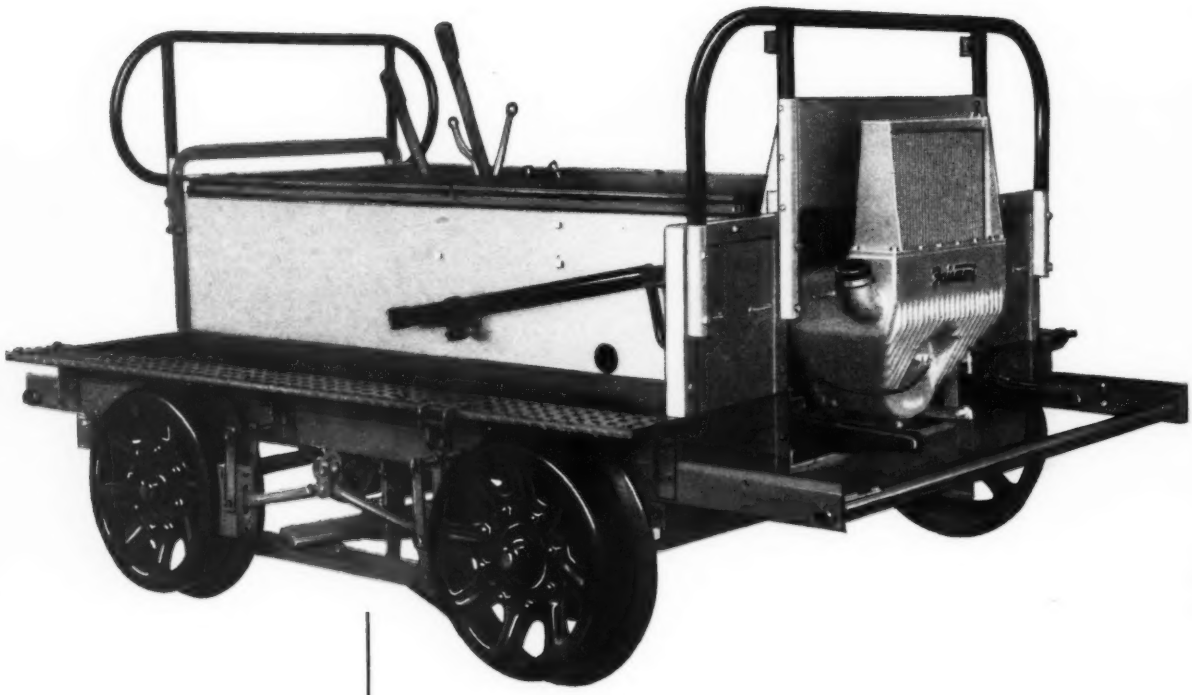

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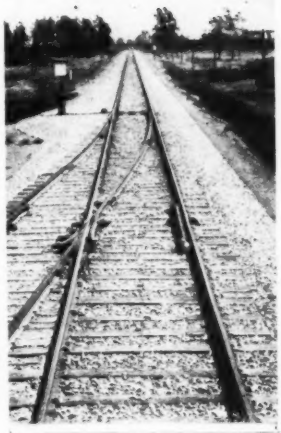


# Railway Engineering and Maintenance

NAME REGISTERED U. S. PATENT OFFICE

JULY, 1948



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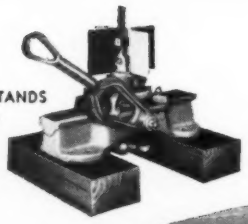

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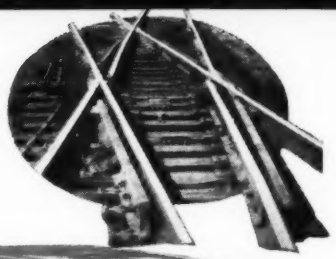

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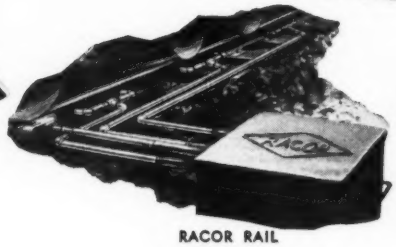


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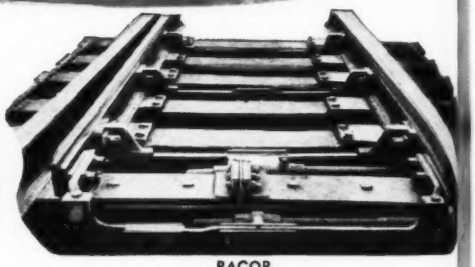

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Railway Engineering and Maintenance

# *Government Ownership—*

## A Preposterous Proposal by Railroad Labor Leaders

In a statement issued to the press on May 25, the Railway Labor Executives' Association, which claims to speak for a majority of the nation's railway workers, demanded that the government, which has already taken over the operation of the railroads on a temporary basis, begin preparation for the transfer of railroad ownership from private interests to the United States of America—on a permanent basis. From every standpoint—of national and public interest, employee welfare, and even the interests of railway labor organizations and their leaders—this proposal is unsound to the point of being ridiculous; may well be considered evidence of insincerity on the part of its proponents; and would not warrant comment if it were not for the possibility that the few New Deal politicians, a part of the general public, and at least a segment of unthinking railway employees, might take it seriously. That the proposal—or was it a strategy move, a diversionary tactic, or a bogey-man—was made at all, is preposterous.

The proposal is preposterous because, as pointed out by Edward C. Collins in the New York Times of May 31—to most persons the subject of government ownership of the railways has long since passed on to its final abode; never had enough vitality to raise it much above the level of material for a high-school debate; and for at least the last 30 years has not even possessed a sufficient number of red corpuscles, so to speak, to enable it to meet the requirements of even this light form of intellectual exercise.

It is preposterous because its proponents know full well, as pointed out by Mr. Collins, by many railway officers, by unbiased students of transportation, and even by government officials, that government operation of the railroads during World War I was disastrous from both an operational and a financial standpoint, and that, on the other hand, during World War II, under private ownership and operation, the American railroads covered themselves with glory by providing unparalleled service, while paying the government more than $3 million a day in taxes.

It is preposterous because, as has been demonstrated in country after country that has nationalized its railways, such nationalization or socialization has tended to stifle initiative and enterprise; has imposed a heavy burden upon the taxpayers; and has fostered political maneuvering that has put selfish and sectional interests above the general public welfare.

It is preposterous because it implies that under government ownership and operation railway workers would get a much larger percentage of the income of the railways, and increased "mock-work" provisions of the character railway managements found it economically impossible to concede in their recent prolonged negotiations with the Brotherhood of Locomotive Engineers, the Brotherhood of Locomotive Firemen and Enginemen, and the Switchmen's Union of North America.

As to the share of workers in the income of American industries under private control and operation. and especially the American railroads, President R. E. Woodruff of the Erie, answered the question convincingly in a recent address before the Central Railway Club of Buffalo when he said, in part: "The facts are that for the last 17 years employees in American industry have received 89 cents of each dollar of income produced under our capitalistic system; the remaining 11 cents was available for dividends to corporation owners and for re-investment in the business for future improvements. In the railroad industry the ratio was 93 cents for employees and 7 cents for the owners, the latter being either in the form of dividends or plowed back into the property—" (for the benefit of the public, the employees and the owners.)

*(Continued on page 702)*

**And the proposal by the railway labor leaders that the government take over the ownership and operation of the railroads is patently insincere on their part, if only because of the serious threat which the proposal holds to their own power and influence in railway organizations, if not to their personal incomes, which it is certain they are not willing to jeopardize or relinquish.**

**In considering this proposal, every railroad employee, in his own interest, if for no other reason, should keep clearly before him the blessings he now enjoys under our free, competitive enterprise system—commonly referred to as the American Way of Life. It is an unassailable fact that no other economic system in the world has ever created so much wealth in so short a time, and that under no other economic system in any other country have so many people shared so abundantly in the national wealth and had so much freedom to grow intellectually and spiritually.**

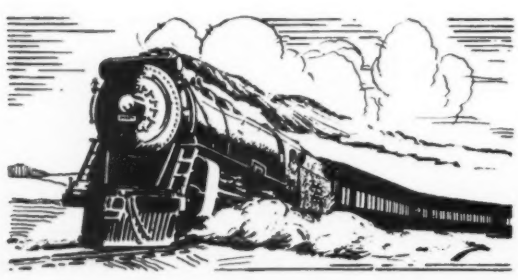
# Crosstie Wear—

## Now Under Attack on Broad Front

OF ALL the tests now being conducted by the railroads, individually and collectively, to develop useful information pertaining to the tracks and structures, none is of greater significance than that which has been established on the Louisville & Nashville in an effort to solve the problem of tie wear under the tie plates (see article, opposite page). Except for fuel the railroads spend more money for crossties than for any other item of material, and, since tie-plate cutting is now probably the outstanding unconquered enemy of tie life, the rewards to be realized when this enemy has been put to rest are rich indeed.

The test on the L. & N., which is a cooperative venture between the railroad and the A.A.R., was installed only last fall, and obviously at least several years must elapse before even tentative conclusions will be possible. For the time being, therefore, the test can be of little more than academic interest, except for the revelation it affords of the amazing variety of devices and materials that have been devised in an effort to solve the problem. This fact bespeaks wide interest in the investigation on the part of the supply industry and its eagerness to help in the search for an effective solution.

Aside from the test on the L. & N. the problem is being attacked from other quarters, including numerous investigations by individual railroads and a joint project by the A.A.R. and the American Lumber Manufacturers' Association. With the attack being pushed on such a broad front there can be no doubt of victory.



# Rail Laying—

## Close Supervision Is of Paramount Importance

THERE is no phase of maintenance-of-way work in which good workmanship is more important than when laying rail. Carelessness or negligence in any of the operations involved in this work can lead to all sorts of evils, including damage or premature wear of the rails and crossties and greatly increased maintenance costs later on.

There was a time when many maintenance men put primary emphasis on quantity production when laying rail; it was quite in vogue to endeavor to establish records in the number of rails laid per day with a given number of men. When it became apparent that such haste was often resulting in waste in the form of inferior workmanship the pendulum began to swing in the other direction. At present the most common policy is to endeavor to achieve the greatest output consistent with a high quality of workmanship—and this is as it should be.

Even with this policy there is need for constant care and vigilance in order to insure that the work will be done properly. In view of all that has been learned about proper methods of laying rail it is surprising how many imperfections in workmanship a practiced eye will observe when inspecting some rail-laying gangs at work. Improperly driven spikes, tie plate shoulders under the rail base, cocked joint bars, and improperly adzed ties are some of the defects most commonly noted.

Consider, for example, the adzing problem, especially as it is presented when the new tie plates are larger than those being removed. The experienced track man does not have to be told that serious results will ensue if the tie plate seat is not adzed down sufficiently to eliminate the shoulders of the old adzed area. He knows that the bridging of the tie plate across these shoulders will very likely result in the crushing of the wood fibers, exposing the tie to decay; that the flexing of the tie plate will result in premature loosening of the spikes; and that the tie plate is apt to become bent or otherwise damaged.

If it is common knowledge that serious damage does result from this and other types of poor workmanship in rail laying, why are such practices permitted? To an important extent the answer lies in a lack of proper supervision. It is sad but true that many workmen have little interest in doing their job well; if they "can get away with it" they are apt to do their work in a way that is easiest for them, and the result is frequently an inferior job.

Close and continuous supervision on the part of the foreman and his superiors is the only antidote for this attitude. To tell a workman once how to perform an operation is not sufficient; he must be observed continually with the object of detecting and correcting any tendency to back-slide. Only when a supervisor has schooled himself to this practice of constant observation can he say that he is doing his part to prevent inferior work.

Part of the test installation on the Louisville & Nashville is located on this 4-deg. 30-min. curve

# Extensive Test to Give "Low Down" on Tie Wear

**In an effort to determine the relative merits of various devices and materials in reducing the mechanical wear of ties under the tie plates a comprehensive service test has been established under the sponsorship of the Track committee of the American Railway Engineering Association.* Located in a main-line track of the Louisville & Nashville, this test is a cooperative effort of the railroad and the Association of American Railroads. This description of the test is based on a preliminary report submitted by the Track committee at the March convention and material prepared subsequently by the research staff of the Engineering division, A.A.R.**

IN A cooperative project between the Association of American Railroads and the Louisville & Nashville, an extensive and comprehensive test installation of tie-plate hold-down fastenings, tie pads and adhesives has been established in main-line track on the L. & N. This test is an outgrowth of recent increases in the costs of ties and the labor of inserting them, which have served to emphasize the importance of extending the service life of ties by reducing mechanical wear. The purpose of the test is to determine from periodical measurements of tie-plate penetrations, track gage, curvature and cross level, and other observations, the relative economy and effectiveness of the various products under test.

This test installation is located in the northward main track of the L. & N.'s double-track main line at a point about five miles north of London, Ky. The location includes a stretch of tangent track, ⅞ mi. long, in miles L-154 and L-155, and a 4-deg. 30-min. curve to the right, with 5 in. of super-elevation and a total angle of 89 deg. 12 min., in mile L-154. A short 4-deg. 30-min. curve to the left separates the test curve and tangent. The test curve is on a summit with a grade of 0.5 per cent descending each way; the tangent section is on a 0.65-per cent grade ascending against traffic.

Authorized speeds in this territory are 60 m.p.h. for passenger trains and 45 m.p.h. for freight trains, with speeds over the test curve being restricted to 45 m.p.h. and 35 m.p.h. for passenger and freight trains, respectively. Some freight trains operate over the curve at speeds as low as 20 m.p.h. The traffic is estimated to be 25 million gross tons annually, a large proportion of which consists of loaded coal cars. Most of the coal trains are double-headed with two M-1 class, 2-8-4 type locomotives, or one M-1 class and a Mikado-type locomotive.

The test track is constructed with 131-lb. RE rail, 24 ties to the panel, and graded stone ballast having a maximum size of 1½ in. The inner and outer rails of the curve have, re-

*In charge of this investigation for the Track committee is a subcommittee of which Blair Blowers, chief engineer maintenance of way of the Erie, is chairman.

| Section No. | No. of Test Ties: Creo. Curve | Oak Tang. | Pine Tang. | Total | Number and Type of Hold-Down Fastenings per Tie Plate and Tie Pads (131-lb. RE Rail) |
|---|---|---|---|---|---|
| 1 | | | | | Adhesives - no anchor spikes - subdivided as follows: |
| 1.1 | 11 | 6 | 12 | 29 | Beckosol No. 40. Heated and applied to bottom of tie plate with a paddle |
| 1.2 | 9 | 9 | 9 | 27 | Waterproofing Asphalt, AREA Specifications. Applied in the same manner as above |
| 1.3 | 0 | 4 | 6 | 10 | CASCO Flexible Cement NT-442. Applied to tie plate and tie in the field |
| 1.4 | 3 | 3 | 6 | 12 | NT-442 Cement applied to tie plate as a primer and CASCO PHEN RS-216 applied to tie plate and tie in the field |
| 1.5 | 9 | 9 | 9 | 27 | Same as subsection 1.4 except the tie plates were cemented to the ties before creosoting |
| 1.6 | 2 | 0 | 0 | 2 | Premolded sheet of asphalt, 1/8 in. thick, made of regular Bird tie pad coating, designated No. 52 |
| 1.7 | 2 | 0 | 0 | 2 | Premolded sheet of asphalt, 1/8 in. thick, made of regular Bird tie pad coating modified to further reduce flow, designated No. 53 |
| 1.8 | 2 | 0 | 0 | 2 | Same as No. 53 except the asphalt was formed around brass screening, designated No. 54 |
| 1.9 | 2 | 0 | 0 | 2 | Same as No. 53 except the asphalt was formed around 1/4 in. mesh galvanized screening, designated No. 55 |
| 2 | 59 | 47 | 48 | 154 | No anchor spikes |
| 3 | 24 | 31 | 32 | 87 | 1-ply Bird tie pads, no anchor spikes |
| 4 | 47 | 32 | 32 | 111 | 5-ply Bird tie pads, no anchor spikes |
| 5 | 49 | 31 | 32 | 112 | 7-ply Bird tie pads, no anchor spikes |
| 6 | 0 | 32 | 32 | 64 | No anchor spikes, 2 Racor Drive Tight (Sandberg) line spikes |
| 7 | 58 | 32 | 32 | 122 | 2 each of Racor Drive Tight (Sandberg) line and anchor spikes |
| 8 | 60 | 31 | 32 | 123 | 2 cut spikes for line and 2 Racor Drive Tight (Sandberg) anchor spikes |
| 9 | 59 | 48 | 48 | 155 | 2 each of cut spikes for line and anchors |
| 10 | 59 | 47 | 49 | 155 | 2 cut spikes for line and 2 round head cut spikes with single coil spring washers for anchors |
| 11 | 59 | 47 | 47 | 153 | 2 cut spikes for line and 2 round head Dowel Studs with double coil helical spring washers for anchors |
| 12 | 57 | 48 | 48 | 153 | 2 cut spikes for line and 2 Oliver Hold-Down Drive Spikes with double coil helical spring washers for anchors |
| 12 | 2 | 0 | 0 | 2 | 2 cut spikes for line and 2 cone neck type Oliver Hold-Down Drive Spikes without spring washers for anchors |
| 13 | 47 | 47 | 47 | 141 | 2 cut spikes for line and 2 Elastic Spikes of design No. 93 for anchors |
| 13 | 12 | 0 | 0 | 12 | 2 cut spikes for line and 2 Tie Plate Lock Spikes for anchors |
| 14 | 47 | 24 | 24 | 95 | 2 cut spikes for line and 2-3/4 in. thru bolts with single coil spring washers for anchors (Applied in the field) |
| 15 | 48 | 24 | 24 | 96 | 2 cut spikes for line and 2-3/4 in. thru bolts with single coil spring washers for anchors (Applied in shop under load) |
| (a)16 | 60 | 47 | 48 | 155 | 2 cut spikes for line and 2 screw spikes with double coil spring washers for anchors |
| 17 | 60 | 47 | 47 | 154 | 2 AAR spring rail clips and screw spikes for line and anchor spikes on tangent plus 2 cut spikes for line on the curve |
| 18 | 58 | 48 | 48 | 154 | No anchor spikes. Erie RR. standard 13 in. single shoulder tie plate with diamond bottom |
| (a)19 | 59 | 0 | 0 | 59 | 2 cut spikes for line and 2 screw spikes with double coil spring washers for anchors using above Erie RR. tie plate |
| 20 | 0 | 47 | 47 | 94 | 2 Thompson Rail and Tie Plate Clamps with screw spikes and triple coil spring washers for line and anchor spikes on tangent |
| 21 | 0 | 47 | 47 | 94 | Fabco Tie Pads, 1/4 in. thick, no anchor spikes |
| 22 | 0 | 48 | 48 | 96 | 2 cut spikes for line and 2 Oliver Tie Plate Drive Spikes with single coil spring washers for anchors |
| 23 | 24 | 24 | 23 | 71 | L. & N. RR. Standard 14 in. tie plate with 2 each of cut spikes for line and anchors |
| 24 | 24 | 24 | 24 | 72 | L. & N. RR. Standard 14 in. tie plate with 2 each of cut spikes for line and anchors and a Rails Co. clip on alternate tie plates |
| | 1012 | 884 | 901 | 2797 | Totals |

Notes: AREA Plan 5B (Modified) 13 in. tie plate with flat rail seat was used in all sections except as follows: (1) Penn. RR. standard 14-3/4 in. tie plate cut to a length of 13 in. for section 17; (2) Erie RR. standard 13 in. single shoulder, diamond bottom tie plate for sections 18 and 19; (3) L. & N. RR. standard 14 in. tie plate for sections 23 and 24.
In the sections on the curve where no anchor spikes were provided, 4 9/16 in. × 5-1/2 in. cut spikes per tie plate were used as line spikes.
(a) In the north half of each portion of these test sections the double coil Helical (experimental) spring washer was used and in the south half the double coil Thackery washer was used.

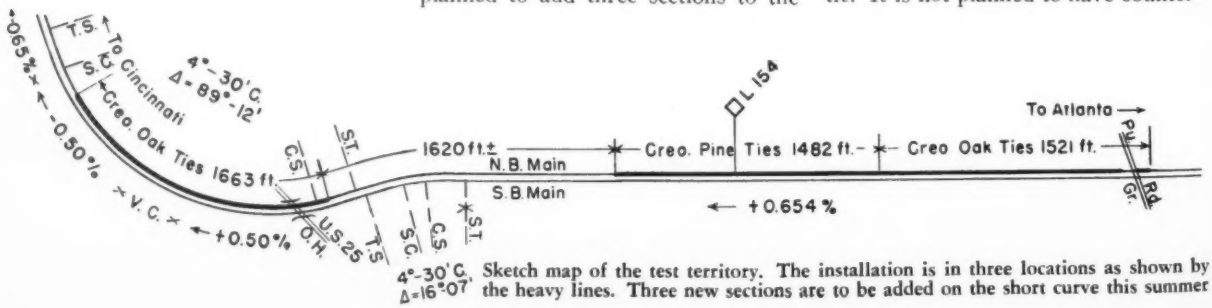
**A summary of the entire test installation is given in this table. During the summer three sections are to be added, all on the short 4-deg. 30-min. curve (see sketch at bottom of page), including two types of tie pads and diamond-bottom double-shoulder tie plates**

spectively, 1940 rail and relay rail laid in 1947, with four-hole head-contact joint bars. Ten forward rail anchors per rail length are used to resist rail creepage. The curve is protected with a rail oiler. The test curve and about one-half the tangent section are located in cuts. The remainder of the tangent section is located on a light fill.

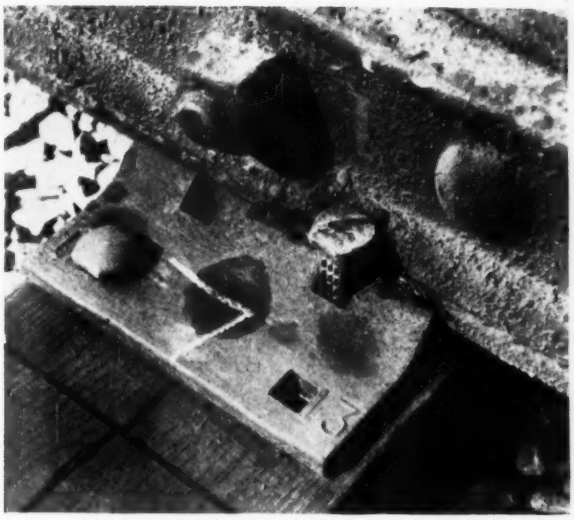
As presently constituted, the test installation consists of 24 sections, mostly 2½ rail panels in length, repeated at three different locations. One of these is on the curve where the ties are of creosoted oak; another is on tangent and is laid with creosoted pine ties; and the third, also on tangent, is laid with creosoted oak ties. At each of these locations the sections are numbered from 1 to 24, and all sections having the same number have the same construction and hold-down fastenings or other devices or products. The accompanying sketch shows the three locations and the numbering of the sections.

Brief descriptions of the 24 types of construction are given in the table. The work of installing the test was started in August 11, 1947, and was completed on September 24. The various types of hold-down fastenings and other products that have been installed in the test were selected to cover all suitable existing designs, and include some fastenings and other materials of recent development.

During the present summer it is planned to add three sections to the test, all to be located on the short 4-deg. 30-min. curve to the left. One of these will be a test of Fabco tie pads, manufactured by the Fabreeka Products Company. Such pads were originally installed in Section 21 of the two tangent locations, and the new curve section will be correspondingly numbered. Another of the new sections, designated No. 25, will be a test of a new asbestos and rubber tie pad developed by Johns-Manville. In the third new test section, to be known as No. 26, the rails will be laid on diamond-bottom, double-shoulder, 13-in. tie plates of a type that is standard for curves on the Delaware, Lackawanna & Western. Each of these plates will have two cut spikes for line and two for anchorage to the tie. It is not planned to have counter-




Sketch map of the test territory. The installation is in three locations as shown by the heavy lines. Three new sections are to be added on the short curve this summer



Above—Section 4 on the curve is laid with 5-ply Bird tie pads. Other sections have 1-ply and 7-ply pads of this type. Right—Sect. 7 on the curve has two Racor (Sandberg) Drive-Tight line spikes and two Drive-Tight anchor spikes per tie plate. Section 8 has two cut spikes for line and two Drive-Tight anchor spikes

parts for Sections 25 and 26 in the tangent locations. Still another addition to the test will involve the application of solvated Sealz coating to the adzed surfaces of six ties in Section 1 on the curve. This coating is a liquid consisting of unvulcanized rubber with synthetic and natural resins added, and is made by the Naugatuck Chemical division, U. S. Rubber Company.

### Materials and Labor

All the tie plates (except those of the 14-in. length used in Sections 23 and 24), and all the hold-down fastenings and other test materials were furnished by the Association of American Railroads, and the railroad furnished all labor and other materials, which included 2,800 new 7-in. by 8-in. and 7-in. by 9-in. creosoted oak and pine ties, 8 ft. 6 in. long. On the curve four cut spikes were used for line where no anchor spikes were specified. All the ties were pre-bored and adzed to a 16-in. width before treatment. Spring washers, under the heads of the hold-down fastenings, were provided in the sections where it was felt they were needed to increase the effectiveness of the hold-down fastening and to extend the intervals between retightening or tapping down. Originally the curve had four Bethlehem insulated gage rods per panel, but these were removed after the test installation had been completed.

For most of the test sections 7¾-in. by 13-in. by 25/32-in. tie plates were used, with flat rail seats, flat bottoms, level shoulder extensions and ¼-in. eccentricity, similar to A.R.E.A. plan No. 5B. In Section 17, where A.A.R. spring rail clips were used, the tie plates are the Pennsylvania standard 14¾-in. plate for 131-lb. rail, sheared to a length of 13 in. These plates were used because the shoulder design is considered more suitable for keeping the A.A.R. clips in correct alinement. For comparison with Sections 2 and 16 respectively, having flat-bottom tie plates (see table), Sections 18 and 19 were constructed with the Erie's standard single-shoulder, 13-in. tie plate with rolled circular crown, diamond bottom and zero eccentricity. The standard double-shoulder 14-in. tie plate of the L. & N. was used for Sections 23 and 24.

The use of adhesives between tie plates and the ties is a relatively new approach to the problem of preventing tie wear. Section 1 of the test installation incorporates various products that come under this classification, and for this purpose has been subdivided into subsections, designated 1.1 to 1.9 inclusive. (The test of Sealz coating, to be installed this summer, will be designated Subsection 1.10.) No. 40 solid Beckosol, used in Subsection 1.1, is an alkyd with a linseed oil base, is very viscous and sticky at room temperature, is non-setting, remains plastic in warm weather, hardens in cold weather and oxidizes slowly when exposed to the elements. This product is manufactured by Reichhold Chemicals, Inc., Detroit, Mich.

The products used to cement the tie plates to the ties in Subsections 1.3, 1.4 and 1.5 are manufactured by the Casein Company of America. These cements or glues take a permanent set in a few days and have a bond strength in shear between steel and creosoted wood of over 1,000 p.s.i. when applied under laboratory conditions. Casco Flexible Cement NT-442, used in Subsection 1.3, is a white dilutable water dispersion of casein and synthetic rubber in liquid form, to which was added 3 per cent by weight of V-18 paste to cause the synthetic rubber to set and the casein to become insoluble. Before applying this material the bottom surfaces of the tie plates were cleaned with a power sander and the adzed surfaces of the ties were dressed lightly with a carpenter's plane to remove the creosote on the surface and to open the wood cells. After the cement had been applied to both surfaces the tie plates were applied and clamped to the ties by four through bolts, which were left in place overnight.

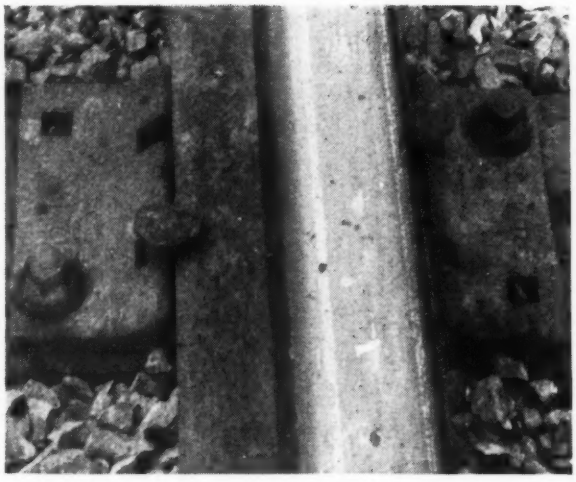
During insertion of the 10 ties in Subsection 1.3, 8 tie plates out of 20 broke bond and became loose. These early failures were attributed, in part, to irregularities which existed in the glued surfaces.

### Two Cements on These Ties

In Subsection 1.4 two cements were used to attach the tie plates to the ties. These ties were prepared in the same manner as for Subsection 1.3, except that the NT-442 cement, with V-8 paste added, was applied to the tie plates as a primer coat and allowed to dry. Casophen RS-216, a resorcinal resin glue, with 15 per cent by weight of FM-60 catalyst added to cause the glue to set, was brushed on both surfaces. The tie plates were then clamped to the ties and left under pressure overnight. None of these tie plates broke bond when the tie plates were inserted in the track.

In Subsection 1.5 the tie plates were attached to the ties before creosoting with the thought that a higher bond strength would be obtained. These tests were prepared in the same manner as for Subsection 1.4, except that no planing was done on the untreated

Showing the new Thompson rail and tie plate clamps (2 per tie plate) in Section 20. These appear in the tangent locations only



Each tie plate in Section 22 has two Oliver tie plate drive spikes with ¾-in. single-coil Hy-Reaction Hy-Crome spring washers

adzed surfaces. No bond failures occurred in these ties during construction.

Subsections 1.6 to 1.9, inclusive, on the curve only, consist of two ties each for the four variations of premolded sheets of asphalt as described in the table. These sheets were suggested and furnished by Bird & Son, East Walpole, Mass., to broaden the investigation of the use of asphalt which is relatively economical except for the labor cost of heating and applying in the field. It would not be practical to use the asphalt sheets in cold weather because of extreme brittleness, except possibly the sheets formed around metal screening.

The Bird tie pads, furnished by Bird & Son, that were installed on Sections 3, 4 and 5 were punched to conform with the tie boring. The single-ply pad is made of a layer of heavy duck coated with a special asphalt modified to flow in warm weather. The 5 and 7-ply pads are made of alternate layers of duck and felt bonded together with standard asphalt, stitched with bronze staples and coated the same as the single-ply pad. The 5 and 7-ply pads are ⅜ in. and ⅝ in. thick, respectively. The asphalt coating is covered with soapstone chips to prevent the pads from sticking together during shipping and to facilitate handling.

### Racor Drive-Tight Spike

As indicated in the table, Sections 6, 7 and 8 have three arrangements of the Racor Drive-Tight spike. Manufactured by the Rampo-Ajax Division of the American Brake Shoe Company, this spike is sometimes called the Sandberg spike after its inventor, C. H. Sandberg, assistant bridge engineer system, Atchison, Topeka & Santa Fe. A feature of the Racor Drive-Tight spike is a fluting on all four sides of the upper area of the shank, the purpose of which is to cause the spike to fill the tie-plate hole completely, minimizing the horizontal movement of the tie plate on the tie and thus reducing mechanical wear. Another feature is a groove in each face of the remainder of the shank. The purpose of these grooves is to facilitate the driving of the spikes in prebored holes, and to increase their holding power in the wood.

The Drive-Tight spikes are made in two designs, a line spike and an anchor spike. Section 6 of the test installation, on tangent only, has two of the Drive-Tight line spikes per tie plate. Since two standard line spikes are replaced per tie plate, the arrangement in Section 6 represents the most economical use of the Drive-Tight spike. Section 7 has two each of the Drive-Tight line and anchor spikes per tie plate, and Section 8 has two standard line spikes and two Drive-Tight anchor spikes.

### Round-Head Cut Spike

In Section 10 a round-head cut spike was designed for use as the hold-down fastening, being used with a ⅞-in. single-coil Hy-Reaction Hy-Crome spring washer as manufactured by the Reliance division of the Eaton Manufacturing company. The purpose was to increase the effectiveness of this type of anchor spike in reducing mechanical wear of ties. In other tests little difference had been shown between the tie-plate penetration with tie plates having only two cut line spikes and other plates having two standard line spikes and two or four cut spikes for anchors.

The round-head Dowel Studs used for anchors in Section 11 are manufactured by the Pittsburgh Screw & Bolt Corp. These are screw spikes of the drive type and have a nut at the top by means of which any slack may be taken up without disturbing the bond between the stud and the wood. The Dowel Studs are used with experimental double-coil helical spring washers which were developed and manufactured by the Reliance Division of the Eaton Manufacturing Company at the suggestion of the research staff of the Engineering division, A.A.R. This spring washer, which has a 0.43-in. deflection when released from a 2,000-lb. load, was developed in the belief that a double-coil washer used with hold-down fastenings should have a large deflection for a moderate change in load. It was believed that such a washer would keep the tie plates tight on the ties for a much greater amount of traffic, reduce the number of tightenings required as well as the danger of overdriving the spikes, and possibly reduce the mechanical wear at a smaller overall cost.

In Section 12 the tie-plate anchorage is provided by Oliver hold-down drive spikes, as manufactured by the Oliver Iron & Steel Corp. This spike is tapped down to take up the slack caused by mechanical wear. It is used with the same experimental double-coil spring washer as used in Section 11. In two ties at the south end of Section 12 on the curve two cone-neck type Oliver hold-down drive spikes were used without spring washers. The cone necks of these spikes are designed to take up the slack in the holes in the tie plates and restrain the horizontal movement of the plates on the ties.

The Elastic spikes (design No. 93) used in Section 13 were furnished by

the Bernuth, Lembcke Company, Inc. This spike is driven down for a deflection of the free end of about ⅜ in., which places a 1,000-lb. load in the tie plate for each spike. In the north 12 ties of Section 13 on the curve the hold-down fastenings consist of a newly-developed spike known as the "tie plate lock spike," in which the shank, somewhat similar to that of the Elastic spike, consists of a bar bent double in such a manner as to form a tapered section that is designed to take up the slack in the tie-plate holes. At the top of this spike the two ends are bent in such a manner as to form a head.

### Rail and Tie Plate Clamp

The Thompson rail and tie plate clamp used in Section 20 is a newly-designed fastening developed and furnished by Thompson Products, Inc. This device is designed to serve as a tie-plate hold-down fastening, a rail anchor and a line-spike. It consists of a screw spike fitted with a triple-coil spring washer and extending through a special clamp that bears on both the tie plate and the rail base. The design of the clamp is such, presenting an inclined upper surface, that the triple coil washer will go solid on the side away from the rail while remaining partly open on the side nearest the rail.

As indicated in the table the Thompson fastenings were applied only on the tangent locations. In one-half of these ties the screw spikes for the fastenings were applied in the conventional manner in prebored holes. In the other half the holes were bored only 5½ in. deep and a wood-hardening material was placed in them immediately prior to driving the screw spikes. The material used for this purpose was a mixture of products manufactured by the Bakelite Company. Laboratory tests had shown that the torque required to remove the screw spikes is increased 100 per cent as a result of the use of these chemicals.

### Fabco Tie Pads

The Fabco tie pads installed in Section 21 are ¼ in. thick and are manufactured from cotton duck and rubber. The material used consists of the trim of the more expensive Fabreeka or similar products before it is cured. This trim or scrap is ground up and then cured in molds under heat and pressure to the desired thickness and size. Holes for spikes are punched in the pads at the factory.

The Oliver tie-plate drive spikes used for anchors in Section 22, applied in the tangent locations only, are similar to but smaller than the Oliver drive spikes used in Section 12. Two of the drive spikes per tie plate were applied in Section 22, each with a ¾-in. single-coil Hy-Reaction Hy-Crome spring washer. Each tie plate in this section also has two cut spikes for line.

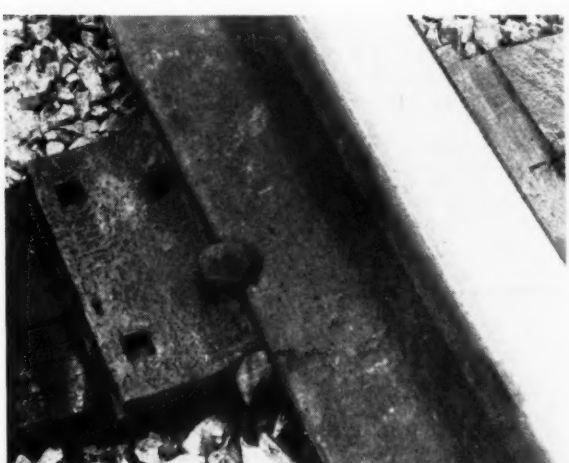
Sections 23 and 24 are of the same construction in that both of them are laid with the L. & N. standard 14-in. tie plate with two cut line spikes and two second-hand cut spikes for anchors. However, in Section 24 a Rails Company clip was added to each alternate tie.

### Readings and Observations

Initial test readings were completed on November 18, 1947. The data consisted of (1) taking dial readings for tie plate penetration, or mechanical wear of ties, which involved setting over 10,000 two-inch, No. 14-gage round-head brass wood screws and placing the same number of chisel marks on the tie plates; (2) measurement of the gage of track at four points in each panel; (3) measurement of the elevation of the curve and taking cross-levels on tangent at two points per track panel; and (4) measurement of the middle ordinate for each outer rail on the curve.

Each year the track gage will be checked on the curve and an inspection will be made of the entire installation to note loose fastenings, tie plates, etc. Because the mechanical wear of ties progresses very slowly with new ties, all other test measurements will be repeated at longer intervals, perhaps every two or three years. The L. & N. will furnish a monthly progress report showing the bond failures of the tie plates in Sections 1.3, 1.4 and 1.5. A record will be maintained of the general retightening and tapping down of the hold-down fastenings, which will be done only as required for a good standard of maintenance.

As stated, this test installation is a cooperative project between the Association of American Railroads and the L. & N. of which C. H. Blackman is chief engineer and L. L. Adams, assistant chief engineer. The planning of the test and the installation work were under the direct supervision of H. E. Durham, track engineer, research staff, Engineering division, A.A.R., and under the general direction of G. M. Magee, research engineer. Olaf Froseth, assistant track engineer, supervised the work of taking the original or basic series of measurements.

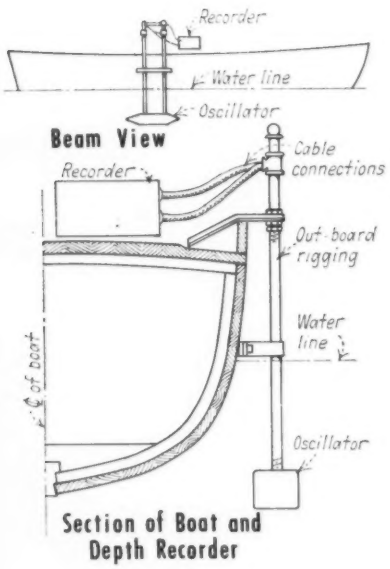


Fabco tie pad in Section 21. An installation of these pads is to be made on the short 4-deg. 30-min. curve this summer

Section 24 is constructed with Louisville & Nashville standard 14-in. tie plates and a Rails Co. clip on alternate tie plates

**Underwater surveying with depth recorders is said to be faster and more accurate than usual methods**

# Underwater Surveys With Echo Soundings




**Section of Boat and Depth Recorder**

AN interesting development relating to studies of underwater erosion and sedimentation in the vicinity of bridge piers and abutments, and changes in river bottoms adjacent to rights of way, is the application to such work of depth-recording equipment employing the principle of echo sounding to determine the depth of water.

Such equipment has been used extensively in recent years by the navy and the shipping industry as an aid in navigation, and in survey work by the United States Coast and Geodetic Survey and the U. S. Army Corps of Engineers. In the railroad field, however, it has seen little application to date. One railroad, however, after noting the results obtained by army engineers in making a cross section of the Mississippi river, using a survey boat equipped with depth-recording equipment, recently purchased a unit which it intends to use in checking the depths of water around bridge piers and in various other investigations where it is desired to ascertain water depths accurately.

**Left—Drawing illustrating how depth-recording equipment is mounted on a boat. Below—A portion of a chart made by a survey boat with a depth recorder while moving upstream on the lower Mississippi**

## Less Time Required

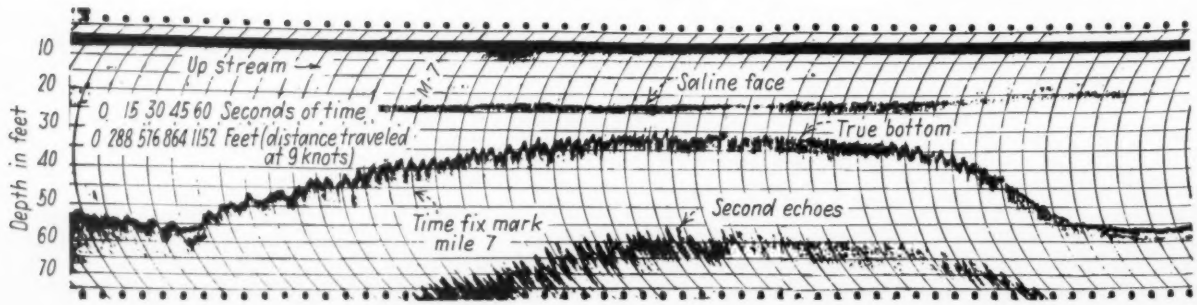
Underwater surveys have, of course, been made by railroads for many years by casting a lead or by pole. For major waterways these conventional methods are time consuming, and, in the case of rivers with swift currents, often inaccurate. The use of commercial types of depth recorders in making such suveys is said to consume but a fraction of the time required by the usual methods, with the additional advantages of high accuracy and of obtaining a permanent record for comparison when periodic inspections are made. Furthermore, it is reported that, in addition to recording the exact profile of the bottom, the instruments are able to show the amount of silt over hard material and the position of the "saline face," or plane of separation between salt water and fresh river water.

Essentially, the depth recorders are instruments designed to measure, and record automatically the exact depth of water beneath a vessel as it proceeds over its course. They utilize supersonic waves which are generated in rapid succession and projected to the water bottom. The time interval between the transmission of each sound wave and the reception of the echo reflected from the bottom is measured electrically and translated into graphically-recorded depths.

## Available Equipment

An instrument of this type that is suitable for use in railway underwater survey work is a portable model, the

(*Continued on page* 711)



# Flow Restored in Clogged Pipe Lines

## on the Norfolk and Western

**This article describes the methods used in cleaning pipe lines at two locations on the N. & W., where the lines had become clogged to the extent that they were no longer capable of delivering water in sufficient quantity to meet normal requirements. Both hydraulic and mechanical methods were employed in cleaning the lines, with the result that, in each instance, the lines were restored to practically their original capacity.**

**Above—Prior to cleaning the supply line, the N. & W. had to operate a booster pump and also had to purchase 350 g.p.m. from an outside source in order to keep this 400,000-gal. tank full. Left—The 12-in. line at Roanoke was incrusted to approximately the same extent as the pipe shown here**

DECREASE in the flow capacity of pipe lines, caused by incrustations, deposits of waste, mud or suspended matter, tubercles, vegetable growth, or insoluble compounds formed by chemical reactions or temperature changes can, as is well known, progress to the point where the lines not only fail to perform at capacity, but also fall far short of delivering even the quantity of water desired or necessary at specific installations served.

Situations of this character were encountered recently by the Norfolk and Western at two water supply installations—one serving a large terminal and shop area, and the other a wayside watering station on an important secondary line.

In both cases, lines that had become clogged were cleaned by hydraulic or mechanical scraping methods and, so far as can be determined, were restored to near their original capacities. This enabled the road to discontinue the operation of a booster pump and the purchase of additional water at one of the locations and assured an adequate supply of water for locomotives at all times at the other location.

### At Roanoke, Va.

The first of these locations was at Roanoke, Va., virtually the "center" of the N. & W., where main and secondary lines from five directions may be said to intersect, and where the road maintains extensive system shop facilities and important classification yards.

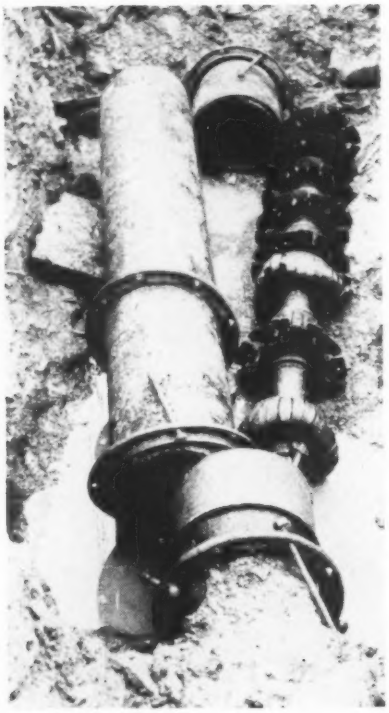
Water for the shops and for engines in the shop and passenger station area is supplied from a 400,000-gal. elevated steel tank located a short distance east of the station. The tank is fed by gravity, from a reservoir located about 2½ mi. to the west, through a pipe line consisting of 5,877 ft. of 18-in. cast-iron pipe and 7,740 ft. of 12-in. cast iron pipe—the 12-in. pipe being at the tank, or lower, end of the line. The line was installed in 1914 and is entirely of the bell-and-spigot type with leaded joints.

The demand for water at this point amounts to approximately 1,000 g.p.m., and for many years the pipe line was able to meet this requirement without difficulty. However, the line eventually became incrusted, reducing its capacity progressively until it became necessary to install a 20-hp. electric booster pump to help keep the tank full of water. Still later, as incrustation increased, even the increased flow provided by the booster was insufficient and the road was forced to start purchasing about 350 g.p.m. from the city in order to meet the water requirements. The cost of the city water, toegther with the cost of operating the booster pump, amounted to approximately $120 per month.

Faced with this situation, it was decided to clean the line by scraping, thereby restoring it to its original capacity—cleaning the 7,740 ft. of 12-in. pipe. The contract for this work was awarded to the National Water Main Cleaning Company, New York. As a preliminary measure, Nalso Formula Number 8 was added to the water at the reservoir to soften the incrustation and thus facilitate the work of cleaning.

### Hydraulic Scraper Used

The pipe-cleaning equipment used in this project is a scraping unit, known as a hydraulic, pressure-type cleaning machine. Used in pipe sizes of 6 in. and larger, this unit is of flexible design and is fitted with pressure diaphragms and six or more rings of cutters for removing the incrustation. In lines of 6 in. in diameter and smaller, the units are ca-



pable of passing through valves and bends up to 45 deg. In lines larger than 6 in. in diameter, they will pass through a 90-deg. bend.

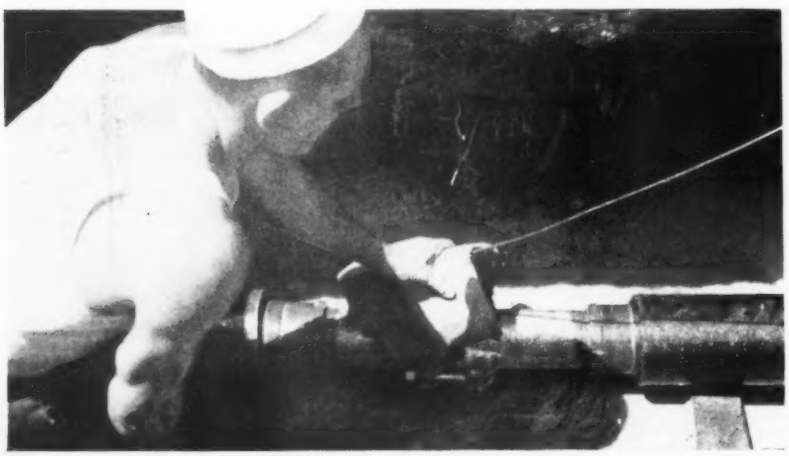
In pipe-cleaning operations with this equipment it is the practice to cut the line ahead of the section to be cleaned and insert the unit into the pipe. The line is then restored with a section of plain-end pipe and Dresser couplings. At the lower end of the line, or section to be cleaned, a section of pipe is removed and a 45-deg. bend is installed, sloping upward, with sufficient pipe attached to carry the water and the removed incrusting material to a safe disposal point.

The use of Dresser couplings enables the work to be done quickly and provides a means for opening the pipe readily for future inspection and cleaning.

The scraping machine may be inserted into the pipe by jacking with special equipment or it may be inserted manually after first hand-cleaning a sufficient length of pipe to accommodate it.

Left—A 12-in. hydraulic scraper, of the type used on the Roanoke project, prior to being inserted at the upper end of a line

Above—In the background is a carrier for pulling sash cord through a 4-in. pipe, and in the foreground is a 4-in. mechanical scraper of the type used at Pine Hall. Below—Passing a 3/16-in. cable through a "make up" into a 4-in. line



At Roanoke a Sunday was selected for cleaning the 12-in. line because the demand for water is at the minimum on that day. The water supply was first shut off at the reservoir and the line was drained quickly with the aid of the booster pump. The upper end of the 12-in. line was opened and the scraping machine was inserted by jacking, after which the line was closed. Inspection of the pipe at this time indicated that its effective diameter had been reduced to approximately 6 in. by incrustation.

### Only an Hour Required

When all was in readiness water was turned back into the line. About an hour was required for the machine to travel—propelled by the pressure of the water—throughout the entire 7,740 ft. of pipe. This was considerably less than the time normally required under similar conditions and was attributed largely to the effectiveness of the softening compound which had been added to the water. Approximately 70 cu. yd. of material was removed from the pipe, including numerous pieces of lead, weighing up to 60 lb. each, which had flowed into the pipe when the joints were poured at the time of its construction. All of this material was flushed out progressively at the open end of the line as the cutting unit moved through the pipe.

After the cleaning of the 12-in. line the N. & W. was able to discontinue the purchase of water from the city, although it was still necessary to use the booster pump. During the night the tank would fill until the water level reached the maximum height—55 ft. above the ground. During the day, however, under normal draw-off requirements, the level in the tank would fall gradually to about 25 ft., almost exhausting the supply, even though the pump was run constantly.

### Cleaning the 18-in. Line

A few months later the 18-in. line was cleaned—this time on a holiday—again using the hydraulic scraping machine. Although only 5,877 ft. of pipe was involved in this section, the work required several hours longer to complete than the cleaning of the 7,740 ft. of 12-in. line. About 25 cu. yd. of material, including lead, were removed.

After cleaning the section of 18-in. line, it was possible to discontinue the use of the booster pump. The tank has since remained full at all times,

indicating that the pipe has been restored to practically its original capacity—at least to the extent that it is meeting the demand of 1,000 g.p.m.

### At Pine Hall, N.C.

The water-supply problem at the second location—Stultz, near Pine Hall, N.C.—was of a somewhat different character. In this case the facility involved was a wayside tank for locomotive water, located about 24 mi. north of Winston-Salem, N.C., on the line between that point and Roanoke. The tank is fed by gravity from a 4-in. line, 4,700 ft. long, leading from a reservoir formed by damming a stream. This pipe line had become silted to the extent that the flow had decreased from its normal capacity of 150 g.p.m. to about 30 g.p.m., or 43,000 gal. a day.

This condition had existed for some time, but was not considered serious because most trains took water at Winston-Salem and relatively few normally stopped at Pine Hall for water. However, during a serious drought last year in the watershed that furnishes the water supply for Winston-Salem, the city's reserve supply was largely depleted. As an emergency measure, the city placed severe limitations on the use of water for industrial purposes, among them being a restriction on the use of water for locomotives. This restriction remained in effect for several months.

### Demand Suddenly Increased

As a result, it became necessary for all southbound locomotives moving on the Winston-Salem line to take a full tank of water at Pine Hall, the water station nearest to Winston-Salem, so as to have a sufficient supply for the lay-over at the south end of the line. Likewise, all northbound locomotives had to take water there. This increased demand, involving four passenger trains and an average of eight freight trains daily, was greatly in excess of the reduced capacity of the clogged supply line and the National Water Main Cleaning Company was called on to clean the line. Mechanical methods were used in this case since the pressure of the water in the pipe was not sufficient to propel a hydraulic scraper.

The general procedure followed in such cases is to shut off the supply, cut the line at suitable intervals and insert a carrier, with a length of sash cord attached. The sash cord is threaded through a special coupling, known as a "make up", which permits the cord to be fed into the line. The "make up" is then installed in the line temporarily.

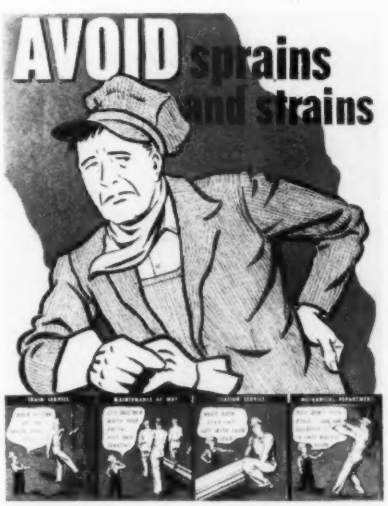
Water is then turned into the line and the carrier is carried through the pipe by the flow. When the carrier reaches the next lower opening, the water is turned off, the "make up" is removed, and a length of light steel cable is attached to the sash cord and pulled forward through the line. The lower end of the cable is fixed on the drum of a power winch and the upper end is attached to the nose of the scraping tool, which is then inserted at the upper end of the line, after which the line is closed by a length of pipe and Dresser couplings.

Water is again turned into the line and the scraper is drawn through by the winch, aided by the force of the water on the tool. This operation is carried out progressively in each section until the line has been thoroughly cleaned.

As in the case of larger lines, it is the usual practice to add sufficient pipe at the lower openings in each section to dispose of the water. However, a "make up" is also installed at the lower opening to permit the cable to pass freely from the line being cleaned to the winch, while the water continues to flow through the disposal pipe, thus avoiding filling of the trench.

This procedure was followed at Pine Hall and, as was expected, the material removed consisted largely of mud and silt. When the line was returned to service it was found that its capacity had been increased to the point where the tank was kept filled without difficulty.

These pipe cleaning projects were carried out under the general direction of W. P. Wiltsee, chief engineer of the Norfolk & Western, and W. L. Young, principal assistant engineer.




**Safety section Poster No. 291, issued by the Association of American Railroads, for use by the railroads during the "All the Year—Every Year Safety Program"**

## Underwater Surveys with Echo Soundings

(*Continued from page* 708)

Type 808 Fathometer, manufactured by the Submarine Signal Company, Boston, Mass. It is powered by a 12-volt storage battery and can be mounted for survey work in a small row boat. It consists of two units, of which one, the recorder, containing the recording mechanism, amplifier and power supply, is carried in the boat. The other unit, known as the transmitter-receiver, is mounted in a streamlined mahogany "fish" which is hung over the side of the boat by an outrigger arrangement in such a manner that the transmitter-receiver is submerged to a depth about at the same level as the bottom of the boat. The two units are connected by waterproof cables terminating in plugs.

As the boat moves over the course being surveyed a strip of chart paper in the recording mechanism receives 11 depth indications per second which are indicated on the paper. In other words, when the boat is traveling at approximately 7½ m.p.h. a depth marking is made on the chart for every foot of travel, thus obtaining a continuous profile of the bottom. A dry type of chart paper is used, which, along with the markings, does not deteriorate with age. The maximum error in the results obtained in the use of this instrument is said to be in the order of 0.5 per cent. The approximate weight of the recorder unit is 95 lb., while that of the transmitter-receiver unit is 100 lb. This company also manufactures a more economical portable model, called the Fathometer Jr., which can be used in situations where extreme accuracy is not required.

Another instrument designed especially to record relatively shallow depths is the model ES-123 Depth Recorder manufactured by Bludworth Marine, New York. This model is also powered by a 12-volt storage battery. Depths of water from 0 to 180 ft. may be permanently recorded in three ranges (0 to 60 ft., 60 to 120 ft., and 120 to 180 ft.,) at the rate of 300 soundings per minute. In this instrument, as in the one described above, the portable recorder, containing the operating controls, electronic circuits and the chart propulsion mechanism, is carried in the boat and is connected to an outboard oscillator (transmitter-receiver unit) by cords and plugs. If fully portable equipment is not required, the oscillator may be mounted on the boat in a pierced-hull arrangement, or it may be keel mounted.

# How to Get Better Concrete—

# Manufacturing Procedure

In this installment the author directs his attention to the various details that necessarily enter into the correct manufacture of concrete in the field. After pointing out the inevitable results of faulty procedures, he discusses the proper handling of aggregates, batching, mixing, and ways to prevent segregation. The article then offers suggestions for the placing of concrete under special conditions, for the proper use of mechanical vibrators, and for the formation of construction joints.

No. IV of a Series

By A. J. BOASE

Manager, Structural Bureau
Portland Cement Association

These views show contrast between good and bad construction. The disintegration shown in the structure above resulted from using concrete which was poorly proportioned and too wet. Water rose to the top of each layer and collected along form surfaces, thereby making the structure very susceptible to disintegration, even though all materials used were of good quality. The structure shown below was just as difficult to construct, is exposed to equally severe conditions, and is even older than the other structure

IMPORTANT though they are, the picking out of good materials and telling the mixer man in what proportions they should be used are only two of the many things that must be done right to get the best results with concrete. It is the quality of the finished product that counts, and the way field operations are conducted has as much influence on this quality as the materials used and their proportions. Uniformity of the finished product should be the aim. This requires handling the aggregates by methods that will maintain uniform grading, accurate measurement of all ingredients going into the mixer, adequate mixing, and then the handling and placing of the concrete in such a way as to prevent segregation. Subsequent protection and good curing conditions are also essential. These are not formidable requirements, although they do require attention to a number of details.

### Faulty Procedures

What happens when incorrect procedures are followed is apparent on many projects. On otherwise good, sound concrete structures the top surfaces may be disintegrating due to the weak, porous concrete in these areas caused by segregation and water rise during placing. In some cases this disintegration occurs not only on the top surface but also at the top of each lift or "pour" of concrete and is due to the same cause. Then there is the poorly made construction joint which permits water to leak through, causing discoloration and often disintegration. Ends of walls or the areas on either side of vertical joints often show the results of freezing and thawing while the balance of the concrete is in good condition. Here again, the cause is segregation brought about by dumping concrete at one point and forcing it to the ends of the section. Excess water flows out ahead of the aggregates and cement and gathers at the ends of the section. Inadequate coverage over reinforcing, with subsequent rusting of the bars and spalling of the concrete, is another source

of trouble. In some cases this may be the fault of the design, but more frequently it is due to misplacement of the steel, inadequate provision for holding the steel in place, or areas of honeycombed concrete, which permit moisture to penetrate to the steel reinforcing.

It should hardly be necessary to say that cement must be kept dry until it is used. It should be stored in waterproof bins, weathertight sheds or on raised platforms covered with waterproof tarpaulins. At the time of use the cement should be free flowing. It should be specified and measured in units of a sack unless fractional bags are weighed. Bulk cement should be weighed for each batch.

Measurement of mixing water may be either by a tank of the vertical-cylinder, center-siphon discharge type or by meter. In either case the device should be calibrated before using and should measure consistently within an accuracy of 1 per cent. This is only about a cupful in 6 gal., which brings out the contrast between accurate water control and permitting the mixer operator to add water at his discretion.

### Handling Aggregates

Correct and incorrect methods of handling aggregates are detailed in illustrations contained in a report of the American Concrete Institute—"Recommended Practice for Measuring, Mixing and Placing Concrete," which appeared in the June, 1945, Journal of the Institute, page 625. The sketches, some of which are reproduced herewith, need little if any elaboration. There is a good reason for every recommendation made, such as avoiding any method that permits the aggregate to run down the slope of a stock pile, since this causes segregation of sizes. Round or square bins with sloping bottom to a center discharge will avoid areas from which the material is not readily discharged. Chuting aggregate at an angle against the side of the bin causes segregation of sizes. A better method is to drop the material vertically in the center of the bin.

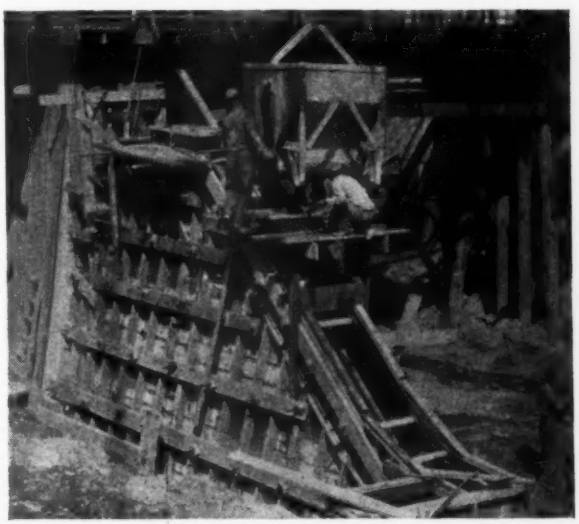
### Stocking Large Aggregates

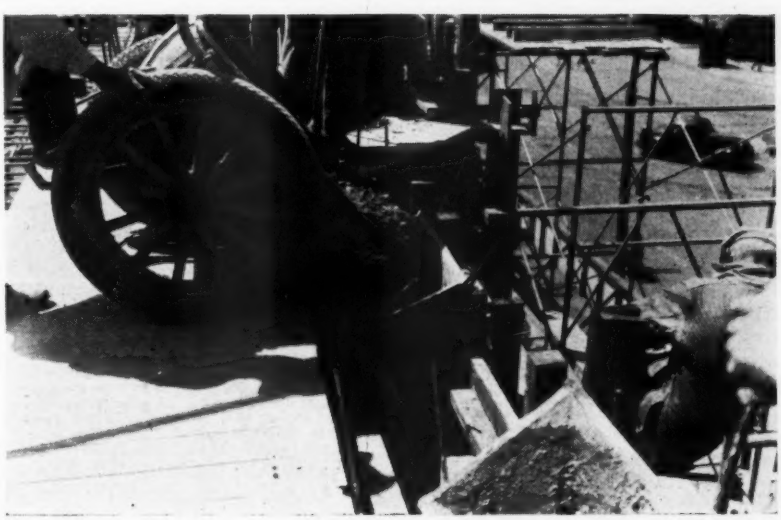
In the interest of maintaining uniformity, aggregates of large size should be purchased, stocked and proportioned in several sizes. Even where the maximum size is 1½ in., two separate sizes, No. 4 to ¾ in. and ¾ in. to 1½ in., will give better uniformity than a single size. Two-inch aggregate may be separated on the 1-in. screen and 3-in. aggregate may be separated into three sizes, No. 4 to ¾ in., ¾ to 1½ and 1½ to 3 in. The use of the separate sizes and recombining them for each batch will facilitate each step in handling and placing the concrete.

The most accurate and convenient method so far developed for measuring aggregates is by weight. A problem that we must always contend with is the variable amount of moisture in aggregate and its effect on the volume, especially in the case of sand. While the amount of moisture in sand may be only 3 or 4 per cent by weight, the volume of the sand may be increased 20 to 30 per cent or more as compared to surface-dry sand. If the amount of moisture and its effect on the amount of bulking were constant, it would be easy enough to make corrections and measure by volume, but unfortunately this is not the case. The amount of bulking will depend on the grading of the sand and the amount of moisture present which, of course, varies from time to time.

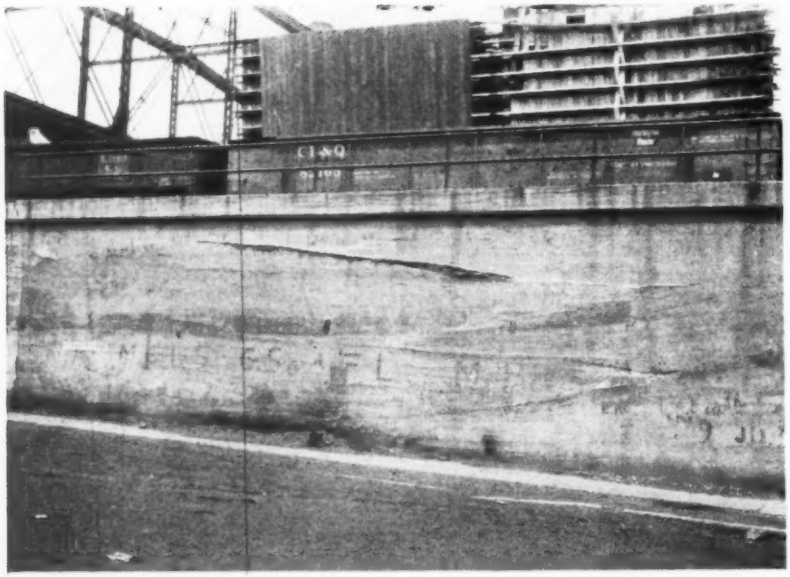
This doesn't mean that it is impossible to get good results with volumetric batching, but even under the best conditions the variation from batch to batch is almost certain to be more than with weight batching. On jobs of any appreciable size the storage bins can be elevated and weight batchers placed under them. On small jobs platform scales should be used. The filled wheelbarrows can be run onto the platform and with a little practice adjustment of only a few shovelfuls will give the correct weight.

Efficient operation of a mixer demands that the drum be kept free of deposits of hardened concrete and that the blades be replaced when they become worn. Overloading or speeding up the mixer beyond that recommended by the manufacturer is bad for both the mixer and the concrete. Tests and observations indicate that





**Right—on sloping wing walls the top of the sloping section should be left open so that the concrete can be placed at several points in uniform layers without forcing it to flow laterally. Below—Placing concrete in deep, narrow wall forms through a rectangular tremie or elephant trunk fitted with a hopper at upper end. The rubber-tired buggy is easier to push and reduces tendency for the concrete to segregate**



Note sloping fill planes, some of them on about a 30-deg. angle. Concrete was dumped into the form near either end of the section and allowed to flow toward the middle

best results are obtained when there is a steady flow of water into the drum the entire time the other ingredients are being charged, and when the cement enters with the aggregates rather than separately. For average mixes and consistencies, the mixing should be continued for at least one minute in mixers up to 1 cu. yd. capacity, and an additional ¼ min. for each ½ cu. yd. additional capacity. In any event, when the concrete comes out of the mixer, it should have a uniform distribution of paste and aggregate and all aggregate particles should be coated with cement paste.

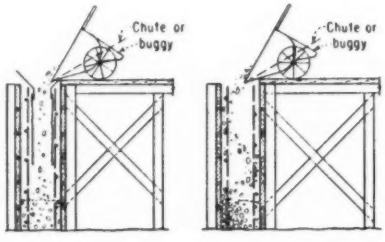
### Ready-mixed Concrete

In recent years there has been considerable increase in the use of ready-mixed concrete and it is now available in many areas. With a properly equipped and supervised plant, good control of the concrete can be obtained with a minimum of equipment on the job site. Whoever is in charge at the receiving end should see to it that each truck load as discharged is of uniform consistency and composition. Segregated concrete should not be accepted. There is sometimes a tendency for the last portion of the batch from truck mixers or agitator trucks to contain too much coarse aggregate, which is often corrected by reversing the mixer several turns before discharging. When this practice fails to correct the segregation other mix proportions should be tried.

Segregation of the ingredients while handling and placing concrete is a potential trouble maker that must be eliminated. Here is where preventive measures really pay in a big way, because segregation that could have been easily avoided is the cause of so much defective work.

### Preventing Segregation

Frequent causes of segregation are allowing the concrete to drop too far, especially where there are horizontal reinforcing bars; chuting the concrete at too steep an angle so that it is thrown a considerable distance beyond the end of the chute; and discharging it against the sides of a container or against the side forms. Falling concrete should be confined in a downpipe, sometimes called an elephant trunk, so that the final drop is in the vertical direction and so that it does not drop freely more than 3 or 4 ft. into either containers




**CORRECT**

Discharge concrete into light hopper feeding into light flexible drop chute. Separation is avoided. Forms and steel are clean until concrete covers them

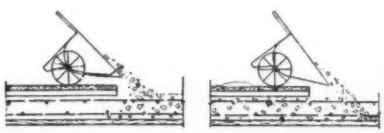
**INCORRECT**

To permit concrete from chute or buggy to strike against form and ricochet on bars and form faces causing separation and honeycomb at the bottom

Fig. 8—Placing concrete in narrow form or forms. Discharge should be into the center of a container, not against the sides.

The depositing and consolidating of the concrete in the forms is the last chance for controlling its quality before the concrete hardens. The temptation to deposit in large amounts at widely spaced intervals, causing the concrete to flow over long distances, is ever present. The practice results in squeezing out water from the mix, which then gathers along the form surfaces and at the ends of sections or any low areas. To avoid this tendency the concrete should be deposited in smaller quantities at closely spaced intervals forming layers of uniform thickness, or, in other words, as near its final position as possible.

Just how thick each layer should be will depend on such factors as size and shape of member, amount and location of reinforcing, consistency of concrete required, and method of compaction, but for most work the layers should be not more than about a foot thick. In heavy mass work the layers may be up to 18 in. thick. In these larger open forms, if the level of each layer is kept a little higher around the perimeter than in the center there will be less tendency for free water to gather at form surfaces. Similarly, in thinner wall sections, free water can be kept from gathering at the bulkheads if the concrete level is kept slightly higher at the ends of each section than in the center.



**CORRECT**

To dump concrete into face of concrete in place.

**INCORRECT**

To dump concrete away from concrete in place.

Fig. 9—Placing slab concrete from buggies

### Other Placing Recommendations

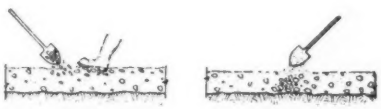
In slab construction each batch of new concrete should be deposited into and toward the edge of the previously placed concrete rather than away from it. This requires that concrete start at the far end of the section, working toward the mixer.

Advantage should be taken of the greater accessibility near tops of walls to place a stiffer mix which will absorb water that has risen to the surface of the previously placed concrete. In the higher lifts it is

good practice to slow down the rate of placing as the top of the lift is approached or to stop concreting for an hour or so at a level about a foot below the top of the lift, then resume the placing. Heaping up the concrete an inch or two above the top of the form and allowing it to settle for an hour before striking it off to the proper level is also a good practice. Better top surfaces and construction joints will result by observing these suggestions.

Over-working top surfaces while the concrete is plastic brings water and fine materials to the top and produces surfaces that may craze and dust and have poor resistance to weather. Troweling unnecessarily wet concrete has this effect. Much better surfaces will result by waiting until the concrete is fairly firm before finishing it.

The sloping ends of wing walls are particularly vulnerable to weather-



**CORRECT** — Shovel rocks from rock pocket onto softer, amply sanded area and tramp or vibrate.

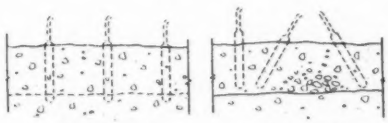
**INCORRECT** — Attempting to correct rock pocket by shoveling mortar and soft concrete on it.

Fig. 10—Treating rock pocket

ing, but there is no reason why they should not withstand the exposure indefinitely. In too many instances the concrete has been dropped into the deep section of the wall and then forced out to the toe. Naturally, segregation occurs under this condition, with subsequently poor resistance to weathering that is evident on so many jobs. The best procedure is to leave the top sloping surface of the form open so that concrete can be placed at several points along the sloping section, beginning at the toe. The top of the form may be closed as concreting progresses.

### Mechanical Vibration

In recent years mechanical vibration has been adopted widely as an aid in placing concrete. The high-frequency internal vibrators now available in various sizes are highly efficient and readily maneuverable. One big advantage is that they permit a stiffer mix having less tendency to segregate; in fact, there is little advantage in vibration on many jobs unless a stiffer mix is used than would be required under hand methods. Vibrators, however, should not be used as a means of pushing the concrete around in the forms. The concrete should be distributed and deposited in its final position and then compacted by the vibrators.



**CORRECT** — Vertical penetration of vibrator a few inches into previous lift (which should not yet be rigid) at systematic regular intervals found to give adequate consolidation

**INCORRECT** — Haphazard random penetration of the vibrator at all angles and spacings without sufficient depth to assure monolithic combination of the two layers

Fig. 11—Vibration of each new lift

Construction joints are a necessity, but why not locate them where they will be least noticeable and fit into the architectural design as well as facilitate the construction of forms and placing of the concrete? The joint may be obscured by using a rustication strip, but where this is not done it should be made a neat, straight, inconspicuous line. One method of doing this is to nail a 1-in. thick wood strip to the form, with its lower edge at the joint line; place concrete to a level somewhat higher than the bottom of the strip; allow the concrete to settle; and then strike it off level with the bottom of the strip. Where V-strips or slightly beveled rectangular strips are used to form horizontal rustications, the joint should occur at the point of the V or at the top edge of the inner face of the rectangular strip.

Certain steps must be taken to get a tight construction joint. The forms should be retightened before resumption of concrete placing. This will prevent the formation of an offset at the joint line and prevent leakage of water or mortar which discolors the concrete below. The surface of the hardened concrete should be cleaned, any laitance or soft material removed, the concrete saturated, and then about ½ in. of soft mortar should be placed, followed immediately by the new concrete. As further precaution against stone pockets in deep narrow walls the mortar may be followed by several inches of concrete in which the coarse aggregate is reduced. This is preferable to using an undue amount of mortar.

If an adequate coverage of sound concrete is provided over reinforcing bars, they will not corrode. Structural members subject to weathering should have a concrete cover of not less than 1½ in. for bars ⅝ in. and less in diameter, and not less than 2 in. for larger bars. Careful workmanship and close supervision are essential to see that the steel is placed as required by the plans and specifications and to make certain that it is completely embedded in the concrete.

## "Gradall" Does A Ditching Job

**IN THE off-track ditching operation pictured above a contractor is reported to have excavated and loaded a mixture of clay, loam, cinders and slag at the rate of 35 to 40 cu. yd. per hr., using a Warner & Swasey "Gradall"—a truck-mounted, multi-purpose earth mover. With the machine working on uneven ground and among tracks and cars, a ditch was excavated by the ½-yd. ditching bucket mounted at the end of the machine's telescoping boom, which is angled, rotated and actuated by hydraulic means.**

# Special Injector for Repairing Bridge Seats

One of the new units in operation, injecting Rust Joint Iron under a bearing plate

REPAIRS to masonry bridge seats on the Erie are now being made with the aid of a recently-developed device for injecting Rust Joint Iron under the masonry plates of steel bridges. With this device such repairs are made without raising the bridge more than an inch, thereby permitting the work to be carried out with minimum interruption to traffic.

The new injector employs compressed air for injecting the Rust Joint Iron under the masonry plates, and usually steam is used to provide the required moisture for setting-up of this material. Each unit embodies a chamber in which the Rust Joint Iron is placed and a miniature boiler in which the steam is generated at a relatively low pressure. Two hose connections are provided on the chamber, one near the top and the other at the bottom. Compressed air from a portable compressor is introduced into the chamber at the top connection and forces the Rust Joint Iron out through the lower hose connection at a considerable velocity. The hose is used to direct the material under the masonry plate of the bridge. At the same time the steam from the miniature boiler—heated by a plumber's torch or a welding torch —is also directed under the plate. The moisture contained in the steam combines with the Rust Joint Iron, and starts the rapid setting action.

Prior to the development of the new injector, Erie bridge gangs found that the work of repairing these bridge seats was a time-consuming process. In one procedure it was necessary to obtain the use of the track, jack up the end of the bridge, support it on blocking or a temporary bent, burn off the anchor bolts and remove the pedestal. When this had been done, the Rust Joint Iron was applied over the bearing area and the pedestal replaced. This method required the drilling of new holes for the anchor bolts. In some instances, the bridge was jacked up only sufficiently to permit the Rust Joint Iron to be placed under the masonry plate by ramming with hand tools. This method, however, was unsatisfactory due to the fact that it was not always possible to obtain a uniform distribution of the material, which resulted in unequal stress distribution over the masonry plates.

The new injector is said to speed the repair work considerably. A number of cases have been reported in which less than two hours were required to perform the complete repair operation at four bearing points. Further, it is reported that the injector permits highly uniform distribution of the Rust Joint Iron, resulting in more uniform loading.

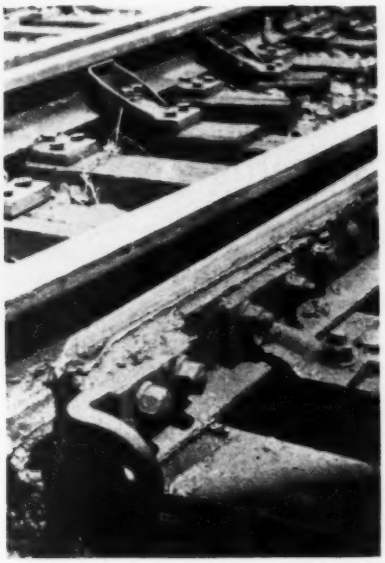
### The Procedure

Briefly, the procedure employed, when using the injector, is to jack up the bridge pedestal sufficiently to release the load from the bridge shoe. In most cases the pedestal is raised ½ in. to 1 in. Steel shims are then inserted between the bed plate and the bridge seat, after which three sides of the plate are caulked with oakum or similar material. The injector is then brought into use to place the Rust Joint Iron under the plate. Traffic is allowed to pass over the bridge in less than an hour in most cases. Later, all sides of the bridge seat are sealed permanently with a coating of asphalt to exclude moisture.

A number of the injectors have been built to date—enough, in fact, to equip each of the Erie's division bridge gangs. Constructed in one of the railroad's shops these machines differ somewhat from each other in design and appearance although the basic principle of operation, as described above, is retained in all of them. In some models a boiler is not used. These models are similar to the one previously described except that they each incorporate a small water tank to which the compressed air line is also connected. The air pressure forces the water through an outlet hose fitted with a special nozzle which vaporizes the water into a fog, the effect of which is similar to steam. An injector of this type is shown in the above illustration.

The injectors described in this article were developed by A. A. Visintainer, engineer of structures of the Erie, Cleveland, Ohio, and Hans Johansen, designer. Use of the units in making bridge seat repairs is under the general direction of I. H. Schram, chief engineer, and Mr. Visintainer.

Left—General view in test location, showing construction of one of the test switches. Below —Close-up of one of the heat-treated switch points after 12 months in service, edge still smooth and sharp, apparent roughness is grease



# Heat-Treated Switch Points Show Increased Service Life

By HORACE C. KNERR

President, Metlab Company
Philadelphia, Pa.

THE BENEFITS of correct heat treatment when applied to ordinary open-hearth steel switch points was demonstrated effectively in a recent series of tests conducted under severe service conditions in a busy yard of a large eastern railway. These tests, extending over a period of nearly a year, showed that heat treatment increased the useful life of the switch points 200 to 800 per cent, with consequent savings in labor and material by eliminating the more frequent replacements necessary with ordinary switch points.

For these tests a location was chosen where heavy wear and resulting high maintenance costs were experienced with ordinary switch points. Traffic in this location is heavy—approximately 2,500 movements daily—but speeds are moderate. Switch points identical with ordinary points, but heat treated, were installed at these locations to determine their characteristics as compared with untreated points under the same operating conditions.

The first test installation was made at a location where conditions were so severe that ordinary switch points wore out in one to six weeks. The heat-treated switch points at this location gave satisfactory service for 45 weeks, or an increased life of at least 750 per cent. Six other heat-treated points showed no serious signs of wear after service periods of 8 to 12 months where untreated points wore out in 1 to 6 months. At the time of the latest inspection the latter heat-treated points, having already shown an increase in service life of 200 to 800 per cent, were all in excellent condition, with an undetermined period of useful life ahead of them.

Inspection also showed that the heat treatment, intended primarily to improve the wear resistance of the slender, tapered portion of the switch point, also prevented battering or mushrooming of the rail head at the heel of the switch point. This was observed at several locations where the ends of the adjoining untreated rails were badly battered while the heel ends of the switch points showed no signs of wear.

### Heat Treatment

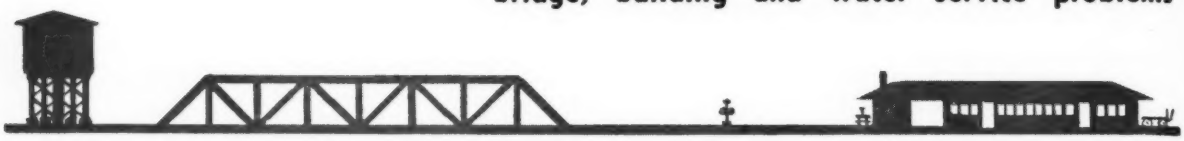
The heat treatment of metals is a highly developed science that has progressed greatly in recent years. When metal is correctly heat treated the internal character of the metal is materially changed, refined and improved, and develops a combination of toughness, reliability, and wear resistance superior to the untreated metal. Heat treatment for best properties involves controlled heating and cooling through the critical temperature of the steel at correctly determined rates, followed by adequate tampering operations—"draw back"—to toughen the metal, impart ductility and shock resistance, and remove internal stresses. Deformation must be kept to the minimum and severe cold straightening must be avoided to prevent internal stresses which may cause the points to bow or twist with age. Steel correctly heat treated is not brittle, and has greater resistance to spalling, mushrooming, or cracking than untreated steel.

In the tests referred to the heat-treated points were initially of open-hearth steel with the following typical composition: Carbon 0.80; Manganese 0.70; phosphorous 0.010; sulphur 0.030; silicon 0.20. Their Brinell hardness before heat treatment was about 240 to 280. After treatment their Brinell was 350 to 375.

Heat treating was done on the entire points after machining, by a process developed by the Metlab Company, commercial heat treaters and engineers, of Philadelphia, Pa. Quenching was in oil, special means being employed to avoid excessive deformation and minimize subsequent straightening operations. The points were made by the Frog Switch and Manufacturing Company, Carlisle, Pa.

# WHAT'S THE ANSWER?

**An open forum for maintenance men on track, bridge, building and water service problems**



## Watertight Glass-Block Panels

*What precautions are necessary when installing glass blocks as exterior walls or windows to insure watertightness under all weather conditions? Explain.*

### Use Care in Caulking

By L. C. WINKELHAUS
Architectural Engineer, Chicago & North Western, Chicago

When installing glass block in exterior walls, lintels must be provided in the same manner as for ordinary window construction, because glass block are not load bearing.

It is the general practice to weld small angles (3 in. by 2 in. by ¼ in.) to the underside of the steel lintels in order to provide a recess for the blocks, oakum, and caulking material. The jambs, or sides of the opening, must also be recessed for the same reason.

When laying glass block, oakum is rammed between the sides of the block and the building construction at heads and jambs. The oakum is rammed back at least ⅜ in. from the finished surface and the recesses thus formed are filled with mastic caulking compound, both inside and out, to provide a tight seal. This caulking should be of such quality that it will not harden, crack, or crumble away, and of a type that will receive and retain paint without affecting color.

### Attend to Details

By K. H. CUNNINGHAM
Manager, Architectural Department, American Structural Products Company, Subsidiary of Owens-Illinois Glass Company, Toledo, Ohio

There are several things to be taken into consideration when laying glass block in order to have the panel watertight under all weather conditions. In the first place, care should be taken to use the recommended mortar mix. This mix consists of 1 part portland cement, 1 part pressure-hydrated or calcium lime, and 4 parts of clean, sharp sand, all measured by volume. Certain prepared mortars are also acceptable. This mortar mix should be kept fairly dry and should be mixed to as stiff a consistency as possible. All mortar joints should be filled completely. These joints should never be furrowed nor should there be any voids. Since a glass block panel is only 4 in. thick, it is necessary that the joints be completely filled in order to do away with the possibilty of any leakage. All joints should also be crowned so that the mortar will completely fill the corrugations that run around the mortar-bearing surfaces of the glass block.

The better and more widely accepted type of glass block construction is that of setting the block in a chase or recess at the jambs. In some instances, however, this is not possible and particular care should be taken to see that the jambs, and also the head, are properly caulked with a good grade of caulking compound. In cases where the panel is not set in a recess at the head, the recess being formed by angles, the head should be flashed so there will be no danger of any seepage at this point.

The sills of all openings to receive glass blocks should be coated with asphalt emulsion. This asphalt emulsion should be applied with a trowel to a thickness of about 1/32 in. The emulsion so applied serves as a bond breaker and will permit such movement of the panel as may occur because of expansion; otherwise there is

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**Answers to the following questions are solicited from readers. They should be addressed to the What's the Answer editor, *Railway Engineering and Maintenance*, 105 W. Adams St., Chicago 3, and reach him at least 30 days in advance of the issue in which they are to appear. An honorarium will be given for each published answer on the basis of its substance and length. Answers will appear with or without the name and title of the author, as may be requested. The editor will also welcome any questions which you may wish to have discussed**

### To Be Answered In the September Issue

1. *To what extent is it desirable that those in the track forces wear safety shoes? Why? Should their use be made compulsory? If not, should their voluntary use be encouraged? If so, how?*

2. *What are the relative merits of rip-rap and steel sheet piling for protecting the foundations of piers and abutments against scour and undermining? Are there more effective means?*

3. *To what extent is the trend toward the mechanization of freight handling affecting the design or construction of freight houses or transfer platforms? What effect does this mechanization have on the maintenance of these facilities?*

4. *What type of floooring is best adapted for use in small passenger-station waiting rooms? In office areas? Toilets? Why?*

5. *How important is it that each railroad be well represented by its supervisory officers in the activities of the American Railway Engineering Association, Roadmasters' Association and Bridge & Building Association? How can such representation best be encouraged?*

6. *What are the latest developments in equipment for finding the specific location of old pipe lines for which there are no records? What are their advantages over earlier equipment or methods?*

7. *What causes fires in railroad fills and embankments? What is the best way to control such fires after they have started?*

the possibility of a crack appearing between the mortar and the sill.

If the directions of the manufacturer are followed, especially with reference to the above mentioned mortar mix, full-crowned mortar joints, correct preparation at the sill and good construction details, the result should be a good glass-block installation which will never leak.

To help educate brick masons in the laying of glass block, we have just prepared a moving picture, "Mortar and Glass," which covers completely all of the phases of the installation of such block. This 16 mm. film is in color and has narrations. It is now available for showings to any group that is interested. Those interested in seeing this movie should contact H. C. Fowler of our Chicago office, 1555 La Salle-Wacker Building.

# To House or Haul Labor Recruits

*In territories where labor is scarce, is it practicable to recruit men at central points where labor is plentiful and move them out on the line daily by truck or work train? Explain. How long a movement is practicable? Is this better than establishing camp outfits? Why?*

## Camps Are Too Expensive

By J. P. Hiltz, Jr.
Engineer Maintenance of Way, Delaware, Lackawanna & Western, Scranton, Pa.

In maintenance-of-way work, especially track work, there is always involved a certain amount of transportation of the men to the location of work from their established headquarters, because it is impossible to establish a camp outfit or any other type of headquarters within walking distance of all locations of their work. This "travel time," of course, is kept to a minimum by changing headquarters and camp locations but, in spite of this, I would estimate that the average camp or locally-headquartered outfit consumes an hour per day in traveling.

Camp outfits, in the East at least, are undesirable for the following reasons: (1) The expense to the railroad in repairing camp equipment and in moving it to the various headquarters, including the cost involved in providing water, light and, in some cases, tracks for camp cars; (2) the daily fluctuation of labor, which makes it difficult to carry on programmed work; and (3) the expense to the railroad involved in transporting the labor that discontinues service, away from the camp, and the replacements to the camp.

In view of these objections, and the fact that all M. W. labor must be transported a certain distance to the point of work, I would say that if good local labor is plentiful at a central point, better work can be performed, at less expense, by transporting this labor daily to territories where labor is scarce.

I have found it more economical to transport good, steady, local labor a distance which would involve as much as one hour's "travel time" each way than to establish camp outfits. In the case of large gangs—150 men or more—this can be done economically by special train, which will cover a distance of 60 mi. each way. For smaller gangs buses or trucks can be used covering a distance of 30 mi. each way.

## Must Have Trucks or Train

By William Lindsey
Yard Foreman, Chicago & Illinois Midland, Pekin, Ill.

Recruiting men in centers of surplus labor and moving them either by truck or train to points of work along the line remains today about the only way maintenance-of-way forces can be kept at a normal level.

Camp cars, however, can not be dismissed entirely from consideration. For large-scale operations, with long moves, camp cars are economical. For short distances up to 30 or 35 mi., the truck or train method of moving has an advantage over camp outfits.

But to undertake a large-scale operation with trucks as the mode of travel would be almost prohibitive in cost because of the long haul. The use of trucks is even more expensive if more than one center of distribution has to be serviced. Camp cars with their same personnel and equipment could service a far larger territory than the trucks, because the trucks' economical limits are such that the expense would be too much for the labor produced.

However, we have run into difficulties in recruiting men for car camps. A majority of the labor recently recruited has been composed of men who have returned from long periods of service overseas. Few, if any, have wanted to live in camp cars, and many have refused to do so. As a result they have been taken out by work trains.

This plan has been used thus far this year to acomplish our rail renewal and surfacing program. This time, however, the men were picked up at a central station and hauled to the job by truck and back again. With the labor situation as it is, this method, at present, seems to be the most effective and practicable.

## Trucks Are Versatile

By Track Supervisor

To offset a labor shortage by obtaining men from a distant point involves a considerable expenditure of money, no matter what method is employed to do it. This expense, necessarily, must be kept as low as possible. Our experience has shown that, of the three usual ways of handling transient labor—housing them in camps, hauling them from their homes to work by truck, or hauling them by work train—the least expensive is that involving the use of trucks, provided the labor can be obtained within a radius of 20 to 30 mi., or about an hour's journey.

By whatever method employed, a capital expenditure is necessary. Costs of camp equipment are high. If camp cars are used, there are the necessary sleeper, kitchen, dining, recreation, laundry, and supply cars. In spite of the fact that they may be reconverted freight cars, they represent a major investment and require constant maintenance. The same is true if buildings are provided. In addition to these costs are those expensive items of bedding materials, cooking utensils and dining equipment. The labor necessary to maintain camps causes an additional drain upon what would already have to be an acute labor situation to justify such camps. The wages and necessary overtime of various cooks, helpers and attendants, depending upon the camp's size, is a further expense. Other high costs in camp operation accrue from purchases of coal, ice, water and electricity. These factors make a camp an expensive operation which should be resorted to only in the event that men can not be recruited within the radius mentioned, which would cover a territory of from 40 to 60 mi. of line.

If there is sufficient local train service, and the available labor is at stations served by such trains operating at hours adaptable to the working period, great economy can be realized by hauling this labor by regular train. When the local service is insufficient, it is not advisable to haul men from the recruiting points

by means of a work train. Work trains are costly. They are also subject to operating delays, causing wasted and needless overtime. Having to handle labor as a priority would also limit the operations of the work trains as to the territory and distance they could cover daily, as well as to limit the number of hours of effective work.

By far the most efficient means of recruiting and hauling men to working locations is by highway truck. This, too, represents a capital investment, although it is small in comparison with the others mentioned. It requires a driver, whose wages are only slightly above those of the men. It provides, however, a fast means of hauling men, either from along the railroad line or off-line. It is not subject to the operational tie-ups experienced by work trains. Its operating costs are relatively low. Outside of the several hours spent hauling men, it can be used to handle materials, tools and other supplies for a large number of sections or gangs. A good man-hauling truck, even when not needed for solving labor problems, is a very essential piece of equipment for any supervisor or roadmaster in taking care of his territory.

In moving men by truck, the headquarters for a gang may be made either at the point of recruiting, if along the railroad line, or at the location to which the recruited men are taken. Gangs of from 12 to 20 men with tools can then be handled effectively to any point of work. Organizations of this kind are especially advantageous at times of emergencies, such as wrecks, washouts, or slides, when the railroad itself may be tied up, but highways are accessible and open.

# Railway Uses for Aerial Surveys

*To what extent can aerial surveys be used to plan grade separations, line revisions, or other improvement projects? What are their advantages? What are their limitations?*

## Aerial Surveys Cost Less

By Leon T. Eliel
Vice President, Fairchild Aerial Surveys, Inc., Los Angeles, Cal., and New York

Aerial surveys can be used to advantage in many railway problems. They not only can be used, but they have been and are being so used. A discussion of this subject can only be effective when reader and author place the same meaning on the term aerial surveys. What is an aerial survey? For the purposes of this discussion an aerial survey consists of any or all of the following: (1) Airview—the ubiquitous bird's eye view—a picture taken with the camera pointed obliquely at the subject; (2) photomap—a single picture or series of pictures "mosaicked" together—exposed with the camera pointed straight down on top of the subject; (3) topographic map—a line map drawn in ink from aerial photographs by the use of photogrammetric methods. This is an engineering map of high precision which is usable as the basis for all sorts of engineering studies and for design purposes.

Thus, if there is a grade crossing problem, a railway executive might get a great deal of assistance from aerial photography from start to finish. He could first have some airviews taken. These simple, oblique photographs provide a picture of the tracks, the nearby road or roads and every building, tree, fence, signboard, siding and all surrounding area. The airview reveals these things to the committee, or the directors, to help in making the initial decision whether or not to undertake the project. Most people can exercise their soundest judgment by combining factual and visual information, and the airview provides perfect collaboration of the facts and statistics for presentation to the management by the lawyers and engineers.

If it is decided to go ahead, the engineers will often need a contour map on which to design the structure and estimate its costs. This map can be produced by photogrammetric methods quickly, economically, and to a very high degree of accuracy. Many engineers do not realize that today photogrammetric methods of making contour maps account for at least 75 per cent of all contour maps made in the United States by both private and governmental agencies.

Aerial photography provides the photomap to aid the valuation department. Photomaps can be made to an accurate scale, such as 1 in. equals 100 ft., which will show every rail, switch, tie, signal, mile post, cattle guard, fence, side road, spur, loading platform, building, bridge, and, in fact, every feature on and near the right-of-way. From these photomaps can be traced the standard valuation maps and the result will be the most complete and accurate map the railway has ever had. The photograph gives a validity to the property inventory which even the most skeptical treasury auditor finds convincing, because "there it is as it exists," undeniable, before his eyes.

For location and relocation problems, aerial photomaps and topographic maps have been used extensively. Many a new reservoir has forced a new railroad location. In the Western country, new locations are frequently considered because of washout troubles. Or perhaps, some double track is to be laid. These problems can be most readily approached with the aid of aerial photography. The pattern is much the same in all cases. Perhaps the airviews will give the chief engineer the clinching argument he needs to get the appropriation. Then, as the first step in the engineering studies, the photomap shows, at an accurate scale, every physical detail of the terrain. Stream channels and their relationship to the trackage show. All buildings and many property lines show. The latter may be seen as fences, or the walls of buildings, the edge of cultivation, etc. Finally, a detailed contour map is made, and from this the final design can be worked out. There are many other applications which, in general, follow the trend of those which have been discussed.

What are the limitations? There are some, of course. Very small projects located great distances from the aerial surveyor's operating base may be uneconomical. Or, there may be a law or regulation that the data must be presented, "thus and so." This brings us to the main limitation which prevents the more widespread acceptance of these valuable aids to specialized railway problems. The chief bugaboo is habit. We naturally cling to the good, solid, proved methods with which we are familiar. They are sound, we are inclined to think, and we fit into these traditional, technical habits like we do in our old bedroom slippers. Why bother about new-fangled methods when the old ones are so comfortable?

The fact that aerial photography has had extensive use by many railways proves that many a railway man has already been convinced that everything that has a dollar mark in front of it is not necessarily expense, but sometimes profit. It is because aerial photography often means less cost and more profit that we may

look forward to its general acceptance by progressive managements of the railroads.

### Aerial Maps Prevent Waste

By Old-Time Locating Engineer

An aerial map would, undoubtedly, be a handy tool for an engineer to have with him "on location", and also be useful to a railroad president in showing his board of directors where the "Mae West" curves are. However, since most railroad engineers have been raised on a transit-and-level diet, I fear they will be somewhat averse to any such radical change.

The "little black bible" published in 1902 by the Northern Pacific, under the direction of E. H. McHenry, chief engineer, says that, "the survey should be of an area, not of a line." That fact still remains basic to any location problem. What a great difference it would have made in the efficiency of our transportation facilities had there been time for this instruction to have been followed more closely—or if we had had aerial photography to do the work for us. But, instead, the engineers were hounded and pushed to get the rails laid, and few people cared where.

A case in point is that of one of our western roads which laid more than 600 mi. of track in one season, with its engineers scurrying ahead like rabbits looking for a means of escape. The result was that within 20 years that line was abandoned—after a cut-off had been built. Most of the bad location work such as this—and there were many such instances—was due directly to the fact that engineers were forced to hurry and locate entirely too much, and were allowed to reconnoiter too little.

In another case of record a large stone monument, to which was attached a bronze relief of a railroad president, was erected at the highest point on what is now a great railroad. That monument soon became a lone, deserted testimonial to the wasted efforts of many men when the line was abandoned and relocated miles away.

Aerial surveys, had they been available then as they are today, would have eliminated such waste. An old timer hopes that knowledge of such surveys and of their effectiveness continues to spread so that railroad engineers will accept them not necessarily as a replacement of the level and transit, but as a supplementary tool with which a better job can be done.

# Why Deaerate Feedwater?

*Why must oxygen be removed from the feedwater used in the steam generators of Diesel locomotives? Should this water be deaerated on the locomotives? If so, how?*

### Oxygen Speeds Corrosion

By J. P. Hanley

Assistant Superintendent Water Service, Illinois Central, Chicago

Iron and steel, as well as some lighter metals used in the manufacture of steam generators, coils, and accessories in Diesel locomotives, corrode in the presence of moisture. When oxygen is present in appreciable amounts in the water, the corrosion is accelerated. The coils of generators are especially vulnerable owing to the mechanical wear caused by high water velocity inside the coil and by the abrupt and substantial changes in temperature of the heating medium on the coil's exterior. The percentage of make-up water is high and the return water available absorbs carbon dioxide gas and other impurities from reactions with the interior of the heating surfaces, as well as additional oxygen from any air leaks in the return system or other exposure to the atmosphere. Therefore, corrosion causes are more pronounced in this type of car-heating unit than is usually ascribed to closed steam heat or hot-water heating systems, where the added percentage of fresh water is low and where air exposure of the return water is limited.

In the manufacture and operation of Diesel locomotives up to the present time, equipment for the degasifying of the feedwater has been omitted. The feedwater has usually been treated with chemicals where necessary to combat the usual types of scale and corrosion. However, the methods used in the treatment of steam locomotive feedwater have not always been adequate for the Diesel unit. This has led to considerable research and test work by railway water-service departments to develop methods that would adequately suit Diesel conditions.

In this work various forms of chemicals, including chromate, tannin and potassium carbonate compounds have been used. Some railways have constructed, and other railways are considering the construction, of water demineralizing plants at terminals and at principal intermediate water stops to supply the Diesel units with this type of feedwater. However, water, conditioned in this manner, would require after-treatment for pH control and does not fully solve the problem of oxygen and gas removal.

In this connection a much smaller unit is also being considered that can be installed on each Diesel locomotive. This unit would combine the present chemical proportioning equipment with a degasifying separator to remove oxygen and other gases. It appears that a separator of this type should serve a very useful purpose for water conditioning, if designed for satisfactory installation on the Diesel and if the operation is reliable and fairly economical. It will be interesting to observe actual trials of this treatment and degasifying unit, which is in the experimental stage at the present time.

### Corrosion Feeds on Oxygen

By H. M. Hoffmeister

Assistant Engineer of Tests, Missouri Pacific, St. Louis, Mo.

Oxygen should be removed from the feedwater used in the steam generators of Diesel locomotives for the same reasons that it should be removed from the feedwater for any other usual steam generator, i.e., to prevent pitting and general corrosion due to its presence.

Corrosion is the wasting away of metal through chemical action. If this attack is general it is called corrosion. If it is localized, it is called pitting. In many cases such attack is due to the presence of oxygen. The corrosion phenomena may be explained by the electro-chemical theory. Water dissociates into hydrogen ions ($H^+$) and hydroxyl ions ($OH^-$). [$H_2O \rightarrow H^+ + OH^-$]. The hydrogen ions ($H^+$) will cause iron to dissolve in water because the ferrous ion ($Fe^{++}$) takes its positive ion from the hydrogen ions ($H^+$) causing them to become hydrogen gas, $H_2$. This will either escape the solution or form an invisible gas film on the iron as an insulator to slow active corrosion.

Without going into the theory of pH values and its more or less involved explanation, it can be simply stated that almost all natural waters and many boiler feed waters possess sufficient dissociated water ions to cause active corrosion.

The effect of oxygen in the feed

water is that of creating a limited sort of perpetual motion in the corrosion cycle. If iron goes into solution (dissolves) in water only in the presence of the hydrogen ion ($H^+$), it can be seen that as soon as the hydrogen ions ($H^+$) existing have been used up, or the limit of solubility of the iron in water has been reached, corrosion would cease and there would be no particular problem. However, as soon as one hydrogen ion ($H^+$) is taken out of play, another due to the pH factor, will pop up, and we will then generally have enough hydrogen ions to keep the corrosion going. The presence of oxygen keeps the iron from reaching its limit of solubility due to the fact that it will oxidize the ferrous ion ($Fe^{++}$) to the ferric ion ($Fe^{+++}$) which will then react with the hydroxyl ion ($OH^-$) to form an insoluble precipitate—$Fe(OH)_3$. This reaction removes the iron from solution as a sludge but also removes three hydroxyl ions ($OH^-$) which will increase the number of hydrogen ions ($H^+$) to continue the cycle.

Oxygen may be removed by simple deaerators, or by adding chemicals into the feed water upon which the oxygen will react in preference to iron. In many cases, however, the simple process of maintaining sufficient alkalinity in the feed water to hold a high pH value low in hydrogen ions ($H^+$) will be sufficient to keep oxygen activity in check.

### New Deaerator Available

By M. A. Hanson
Assistant Engineer of Tests, Gulf, Mobile & Ohio, Bloomington, Ill.

The type of steam generator being used has an important bearing on this subject. Since the only steam generator being extensively used in Diesel locomotives is the Clarkson, the following discussion is limited in applicability to that design.

Oxygen removal by deaeration is the only feasible method known of completely stopping corrosion of the water side of the coils, particularly at the inlet end of the outer coil where the corrosion is most severe.

Tests have shown deaerated water with a pH value of 7.5 or above to be noncorrosive to the coils, and water containing oxygen to be corrosive up to a pH value of 12.5. A pH value this high cannot be economically justified. However, the higher the pH value the slower the rate of corrosion.

Our experience indicates that with feed water treated to a minimum pH value of 9.8 and having total dissolved solids (T. D. S.) of not more than 350 p.p.m., corrosion is restrained to the extent that the life of the outer coil is from 2 to 3 years in passenger service where the heating load is severe, and somewhat longer on units in less severe service.

The lower the T.D.S. of the feed water, the easier it is to restrain corrosion by pH control. Therefore, the extent of the corrosion experienced is dependent upon the composition of the water being used for feed water. Thus, demineralized or distilled water are the easiest waters to passivate chemically.

Attempts have been made to remove chemically the oxygen in feed water by the use of sodium sulphite. These were unsuccessful owing to the slowness of the reaction at the temperatures encountered. Temperatures of 185 deg. F., or above, are required to produce rapid reaction between oxygen and sodium sulphite. A temperature of 145 deg. F. is the highest that the feed pump on the generator will pump water satisfactorily. This method of oxygen removal, therefore, is of no use for this application.

Deaeration can be accomplished by the use of a steam jet deaerating heater installed on the Diesel unit. In this system, the incoming feed water to the heater passes through a heat exchanger to cool the deaerated water to a temperature low enough to permit its being pumped by the steam generator feed pump to the coils. An additional pump must be installed to pump the feed water from the supply tanks to the steam jet deaerator. A complete installation such as this has been developed by a Chicago corporation.

Thus, several factors should be considered before a decision is made concerning deaeration. Some of these are: (1) The coil life with which the user is satisfied; (2) whether or not corrosion is severe enough to justify the additional expenditure; and (3) if satisfactory life can be obtained more economically by modification of water treatment practices. This evaluation must be made by each individual user.

## Using Tie Saws to Renew Ties

*When sawing ties in track during tie renewal operations, can the sawing on one or both sides be carried out a considerable distance in advance of actual renewals? How far? Explain.*

### Let Safety Govern Work

By Roadmaster

Ties can be sawed a considerable distance ahead of actual renewal operations as long as the safety of the track is not impaired. In general, tie saws find their most effective use for spot renewals. Under conditions where such renewal methods can be employed, there are few groups of three or more adjacent ties that have to be replaced.

For most scheduled speeds, tangent track can be considered safe if no more than two adjacent crossties are sawed. Thus, for most conditions under which tie saws are used, sawing operation may proceed as far ahead of actual renewal work as seems most desirable. In all cases, however, good judgment must be used.

The earlier models of tie saws could be used on only one side of the track at a time. If only one saw has been available, it has frequently been the practice to saw one side as far ahead as the contemplated end of the day's work. Sometimes we have started the saw out in the morning several hours ahead of the remainder of the tie renewal gang in order not to delay the gang by the tie-cutting operations.

A new model tie saw has been introduced which permits the saw to be shifted on its carriage from one side of the track to the other. Thus, ties can now be sawed in the usual two locations inside the rails without turning the saw carriage. Therefore, using a single new-model saw, there will actually be no necessity for sawing ties very far ahead of the renewal operations unless other factors make it advisable.

### Advance Sawing Helpful

By C. M. Hayes
General Roadmaster, Minneapolis, St. Paul & Sault Ste. Marie, Minneapolis, Minn.

On lines where only a limited number of tie saws are in use, it is advantageous and permissible to saw ties considerably in advance of tie renewals. This distance may be several miles or an entire section. However, some judgment should

be used on any territory having sharp curves and consideration given to the balance of timber in track.

When sawing ties that are to be left in track for a considerable time before renewing, no more than two successive ties should be sawed. I do not think we can condemn the practice of sawing ties in advance of the renewals, as, after all, the ties that are sawed to be removed must be considered practically worthless from the standpoint of holding power.

# Bridge and Building Laborers

*What are the advantages and disadvantages of definitely assigning laborers to bridge and building gangs, compared with the practice of calling upon the track forces for such help? Explain.*

## Assigned Men Beneficial

By C. M. Chumley
Engineer Maintenance of Way, Illinois Central, Chicago

There is a definite advantage in assigning laborers to bridge and building gangs. The construction and maintenance of bridges and buildings require men who have specialized in these types of work. There is no doubt that better results can be obtained where the employees are experienced, whether they are laborers or skilled mechanics. A trackman may be very efficient on his own work, but in performing other duties entirely foreign to track procedure, he may retard the progress of the work and impair the safety of himself and other employes. Most track laborers are not accustomed to working on bridges, and in cases where they are high and narrow, it is often necessary to assign them to particular type of work for their own safety.

There are, of course, times when bridge and building gangs which, as a rule, travel from place to place, do not have sufficient men to take care of jobs which must be done in a short period of time. In opening up the track for the installation of steel spans, it is generally advisable to have trackmen present to assist. In such cases their duties should be confined to the removal and replacing of the rail, if necessary, and this gang should work as a unit, instead of individually with the bridge gang.

There are other classes of work, such as placing concrete, trenching for pipe lines or other underground facilities, where trackmen can be used to advantage, but here, too, they should operate as a unit. In many cases there might be disagreement as to wages between trackmen and bridge or building labor on any particular job.

In the assignment of laborers to bridge and building gangs, there is no doubt that they could do the work as apprentices and, after some experience, could become very skilled workers. This would tend to increase the efficiency of the work.

## B. & B. Laborers Needed

By Roadmaster

By all means, laborers should be assigned to bridge and building gangs. To my notion it is inequitable to expect the track department to furnish men to do all the work required of B. & B. gangs which does not command a wage rate higher than that of a laborer. While it may be said that the total cost of maintenance of a territory would remain the same regardless of whose men did the work, there remains the fact that in the track department, allotments are soon converted into man-hours. Take from a roadmaster five men to help out a bridge gang and that roadmaster's program of work is incomplete by just about that much at the end of the year. It has frequently been claimed that such inequalities adjust themselves over a period of time, but I seriously question that as factual.

It is desirable that a roadmaster be cooperative, but I doubt if he is worth his salt if he doesn't have enough enthusiasm for his work and enough desire to accomplish or exceed his year's program to make him resist a constant drain on the number of men assigned to him. My gangs have definitely assigned work to accomplish, which will not be completed if they have to spend even one day's time doing the laboring work of the bridge and building forces.

Yes, I definitely favor the assigning of laborers to bridge and building gangs. If they don't have continuous use for them, the track department will be glad to find work in the vicinity for them to do.

# Seasonal Shifting of Machines

*To what extent is it practicable to shift work equipment from one territory to another with changing seasons in order to keep it busy a maximum number of days during the year? Explain. Do some types of equipment lend themselves better to this than others? What types? Why?*

## Idleness Never Useful

By R. E. Buss
Superintendent M. W. Equipment, Illinois Central, Chicago

Work equipment should be shifted from one territory to another with changing seasons as much as is consistent with repair programs and funds available for its use. Idle machines furnish no return on the investment. They are actually liabilities. It is, therefore, desirable that any machine not used to its fullest advantage should be moved to any location on the railroad where it will be used.

Naturally, some machines are more adaptable to such shifting than others. Those machines which function best during warm weather can be shifted from the North to the South in winter. Others lend themselves to the reverse migration.

The first group should include practically all earth-moving equipment, such as tractors equipped with bulldozers or front-end loaders (not required for snow duty in northern territory), wheel scrapers, road graders and American ditchers. Ballast drainage cars equipped with scarifier blades and ballast shaping boxes perform more effectively in warm climes where the ballast or roadbed is not frozen. Discing machines fall into that same category. Jordan spreaders can be shifted south in winter for ditching purposes, unless it is expected that they might be needed in emergency for flanging or plowing snowdrifts. Grouting operations can be performed more economically when the weather is above freezing. Tie tamping equipment which does not need general repairs during the season can be moved south in winter to points where conditions will permit its effective use.

Weed burners, on the other hand, can be transferred from southern, warm territories to northern points for use as snow melters in car-retarder yards, or in engine and passenger terminals. Most of the other machines used in maintenance-of-way work lend themselves equally to use in warm and cold climates. There is little, if any, advantage in shifting such equipment.

A basic truth that must not be forgotten is that there is no advantage in shifting any piece of equipment from one territory to another unless it will be used. Unless a definite need exists, a definite program of work arranged, and money set up for its operation, it would be far better to store the equipment, protecting it from the weather, than to spend money to load and ship it.

### Shifting Not Always Best

By Supervisor

There are at least two ways to look at the problem of shifting work equipment from one territory to another with changing seasons. If I need a machine which I know is idle elsewhere on the railroad, I would like to have it sent to me. On the other hand, if I have a piece of equipment whose season's work has been completed, I sometimes hesitate to ship it elsewhere. Off-hand, this may seem unfair, not only to the man who needs the machine but also to the railroad that owns it.

Bitter experience has forced on me this reticence to give up any machine that I know I am going to need and want again. I and my mechanics take pride in the way we use and care for our equipment. We know that it will serve us only so long as we protect it. We have, in the past, been proud to ship a well-cared-for piece of equipment off our territory so someone else could get the same good from it that we have. We have asked for and received that equipment when we later needed it, only to find that abuse had made it entirely unsuited to the quality of work we wished to do. To put it in shape took almost as long as it was operated while off our territory. Had we been able to keep and protect this equipment—even while idle—the railroad would have been far better off.

It is only natural that a man take better care of something he can think of as his own, than of something he considers the property of someone else. Why not take advantage of this fact by having more units of assigned equipment?

# Renewing Building Siding

*Does there come a time in the life of building siding when, because of appearance or deterioration, it is more practicable or desirable to renew it in kind or with other material than attempt patching, cleaning and repainting? What are the considerations involved?*

### Trend Is Away From Wood

By B. M. Murdock
Engineer of Buildings, Illinois Central, Chicago

The greater portion of existing railroad buildings are of frame construction employing the use of wood siding in various designs. With a good grade of lumber and the application of paint at regular intervals, wood siding should give 30 years or more service life, mechanical injury excepted.

At the end of the service life through wear, tear or a general improvement program, the determination of what to do in each case rests largely on the condition of the individual building, together with its location and use.

In recent years, on this railroad, conditions of the latter kind have, in many instances, been corrected by replacing the wood siding with a rigid type of weather boarding of inorganic material. While this type of exterior finish requires no paint, it is probably more susceptible to mechanical injury than wood siding.

Where the rigid type of weather boarding is applied directly over existing wood siding, it has the additional advantage of providing added insulation to the building.

### Old Siding Still Good

By W. C. Harman
Supervisor of Bridges and Buildings, Southern Pacific, San Francisco, Cal.

Aside from an occasional painting, the maintenance of siding on our buildings gives us little concern. On our frame buildings several types of siding have been used, the very earliest having been the board and batten siding employed largely in the 1860's and the 1870's. Laid vertically, this was usually matched redwood lumber fastened with iron cut nails, well set and puttied. Much of this siding is still in service.

Following this type came the redwood rustic lapsiding with heavy redwood base, corner and facia boards. Laid with leaded joints, nails well set and puttied, this type of siding has never deteriorated to the extent that out-of-face renewal is necessary. Some patching has been required, where the redwood has become dented and marred owing to its soft texture. This has occurred mostly at freighthouse platforms where trucks and runboards are allowed to strike it. Eventually this type evolved into the V-rustic lap siding now in general use and giving economical service.

A great deal of credit for the satisfactory service of our siding of these types can be given to our predecessors in the building departments for the careful selection of material and the skillful carpentry employed in those days. Apparently nothing necessary was left undone to secure stability, durability and appearance of the completed building. Aside from alterations and repairs to roofs and floors, little has been done to these structures since they were built, other than minor repairs and painting. Even where painting has been deferred too long, the wood remains sound.

In those early days a red metallic paint was generally used which, although it presented a grim and austere aspect, had remarkable durability and patches of it are still in evidence. Cleaning and painting at proper intervals is all that has been necessary. This should be done to prevent loosening of the paint and putty at the joints and around the nail-heads where decay may set in and thereby cause deterioration of the siding.

Progress in architecture has developed other types of sidings such as the plaster and stucco coatings and much of this has been included in our modern station buildings. But our architects have been very reluctant to break away from the more durable redwoods to go to the use of pine sidings. This is rightfully so, since its susceptibility to splitting and decay has proved its inferiority.

Where the general condition of the building is such that remodeling and modernization is being considered without complete replacement, the wood siding, stripped of trim, makes an excellent sheathing for backing up a stucco coat and is frequently used as such, especially if it is pine, as there is little economy in replacement with pine siding such as we get these days.

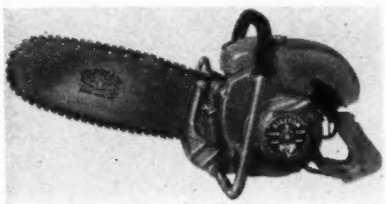
# PRODUCTS OF MANUFACTURERS

**New, improved equipment, materials, devices**

*(For additional information on any of the products described in these columns, use postcards, page 739)*

## One-Man Chain Saw

A LIGHTWEIGHT, one-man chain saw, which is said to operate with equal efficiency in any cutting position, has been announced by Henry Disston



**The Disston one-man chain saw**

& Sons, Inc., Philadelphia, Pa. Having an 18-in. cutting capacity, this saw is designed especially for such work as light sawing and construction timber cutting.

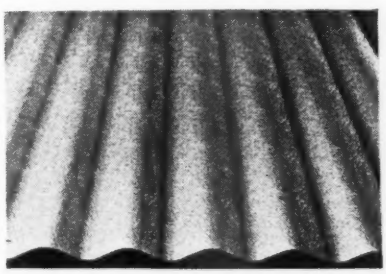
It is powered by a 2-cycle, air-cooled, 3½-hp. Mercury gasoline engine, which is started by a self-winding Magnapull starter built into the engine. The fuel system is designed to permit efficient operation when the saw is used upside down for inverted bucking. A fuel meter is provided which is said to assure a positive flow of properly-mixed fuel to the cylinder and also functions as a governor to control engine speed. The magneto, of the crankshaft type, is protected against moisture and dirt and is claimed to assure positive ignition under all working conditions.

The new saw has a built-in automatic chain lubricator which has only one moving part—a flexible pick-up tube inside the oil reservoir. The lubricator operates under pressure, a feature which is said to prevent clogging of the oil jet hole by dirt or sawdust.

Control of the new saw is concentrated in a pistol-grip handle. The throttle is at the operator's finger tip, with the fuel-mixture control lever nearby. A priming valve is provided for starting the engine in cold weather or when the fuel tank has been run dry. A squeeze on the handle disengages the clutch, and releasing a safety catch re-engages it.

## Embossed Aluminum Roofing and Siding

DESIGNATED as Embossed Corrugated Roofing and Siding, a new type of aluminum sheet, which is said to be suitable for a wide variety of applications, has been developed by the Reynolds Metals Company, Louisville,



**Close-up view of a piece of the Reynolds embossed corrugated aluminum roofing and siding material**

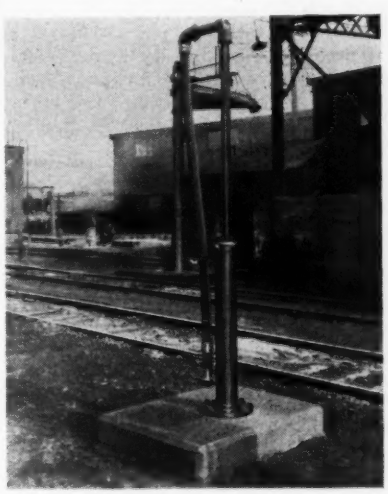
Ky. While retaining the inherent qualities of aluminum as a building material, the new product features in addition an embossed surface which is reported to increase the rigidity of the sheet, minimize the reflection of light, and provide a pleasing uniform appearance.

The increased rigidity of the sheet facilitates handling, thus lowering installation costs, it is said. Because of its pleasing appearance and lack of objectionable glare, the material is said to be suitable for interior wall panels and many decorative purposes, as well as for use as a roofing and siding material. It is available in two thicknesses—.019 in. and .024 in. The standard width of the material is 26 in. and the lengths range from 6 ft. to 12 ft. It is produced with standard 1¼-in. and 2½-in. corrugations and is available also as Type 5, V-crimp roofing and siding.

## Diesel Water Column

THE Railroad Products Company, Cincinnati, Ohio, has developed a new unit, called the Poage Diesel water column, for watering Diesel locomotives, which, it is said, will operate satisfactorily in winter temperatures of 35 deg. below zero. The valve of the new column contains features of the Poage water-hammer eliminator, which is designed to control destructive water hammer in pipe lines.

The overhead type, No. 33, consists of a pit containing the valve; a 2½-in. or 3-in. vertical riser pipe or pedestal; an extending arm joined to the top of the riser pipe by a water-tight swivel joint; and a hose attached to the end of the extending arm, also by a swivel joint. The valve operating lever is located on the top of the pedestal at a convenient height. The swivel joints permit turning of the ex-



**The Poage overhead Diesel water column, type No. 33**

tending arm and hose to service locomotives on two different tracks.

To operate the Poage Diesel water column, the operating lever is pulled downward, opening the valve in the pit and causing an instant flow of water through the riser pipe. After

the locomotive has been watered the operating handle is moved to a vertical position and the supply of water is immediately shut off, the water-hammer eliminator in the valve chamber cushioning any shock set up in the supply line. When the valve is closed all water in the riser pipe drains into the pit, a feature which prevents trouble due to freezing in severe weather. In addition to the overhead type, a platform or box type of the Poage Diesel water column, known as No. 34, is also available.

## Mill Process for End-Hardening Rails

AFTER more than a year of investigation and experimentation with various methods and procedures, a new process for hardening the ends of rails at the mill was developed by the Bethlehem Steel Company at its plant at Steelton, Pa., in cooperation with various suppliers of heating equipment. Another year of engineering and pilot-plant development was necessary before production could be started on a commercial scale. To date, over 30,000 rails, including sections 100 RA, 100 PS, 112 RE, 115 RE, 130 PS, 131 RE, 133 RE, 140 PS, 152 PS and 155 PS, have been end-hardened by this method, representing shipments made to eight different railroads.

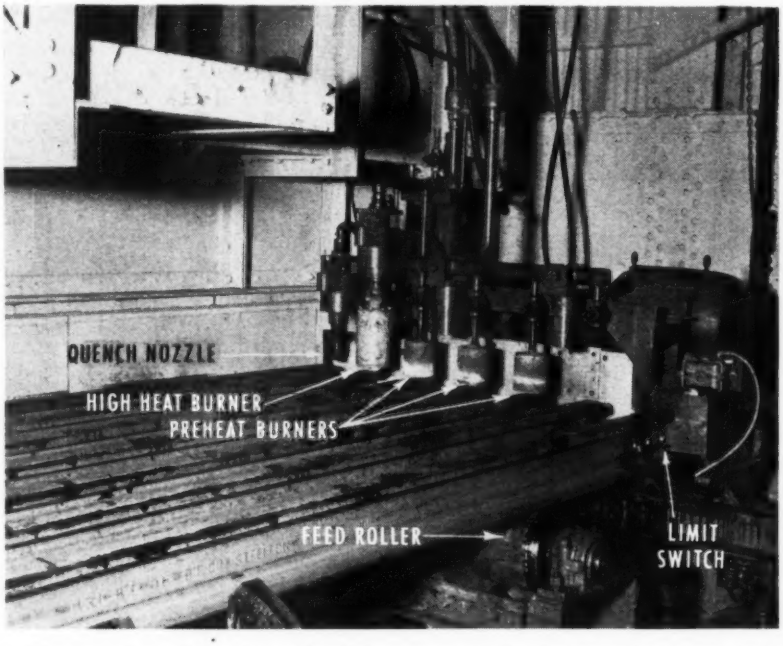
The first unit placed in operation did not provide sufficient capacity for the entire mill production at the Steelton plant. However, now that more than a year's operation of the unit has demonstrated that the method and the design are correct, additional facilities are being installed to meet the demand for end-hardened rails.

### Description of the Unit

The unit developed for the end-hardening of the rails consists of a bed on which the rails are moved automatically both laterally and longitudinally in such a manner that each end of a rail passes under a group of burners (three pre-heat burners and one high-heat burner) and an air-quench nozzle. Thus both ends of each rail are hardened simultaneously.

The heat-treating procedure is applied to new rails after the ending and drilling operations have been completed. Consecutive rails are mechanically positioned on skids preparatory to moving under the pre-heat burners. The longitudinal location for pre-heating is precisely controlled by moving feed rollers and a positioning switch. A hydraulic system then moves the rails laterally at specific predetermined intervals through the three stages of pre-heating by the pre-heat burners, then to high heat, which governs the quenching temperatures, then to the air-quenching stage, and finally to the inspection beds. The high-heat burner and the quenching nozzle are suspended by individual supports, which have only a horizontal motion, thus, it is said, insuring a uniform pattern of hardness regardless of minor variations in the length of the rails.

The heating equipment consists of a carburetor which mixes coke-oven gas and air in a definite ratio; three radiant-cup pre-heaters; a specially-designed high-temperature burner; and the necessary gages and tubing. Through these units heat is transferred to the heads of the rails without flame and in such a manner that overheating and scarfing is said to be impossible. Automatic controls, insuring constant heat transfer to the rails, together with uniform pressure of dry air for quenching and elimination of the personal element, are said to result in a uniformity of hardness and of the hardness pattern.




**A group of rails receiving the end-hardening treatment. The equipment includes a similar set-up for treating the opposite ends simultaneously**

Rails hardened by the method described are reported to have shown no evidence of chipping or spalling after being subjected to 60 million tons of traffic in a test track over a period of one year. They are said to have shown consistent hardness values well within the range of Brinell hardness for the running surfaces of rails as recommended in the Twelfth Progress Report by the University of Illinois engineering experiment station to the American Railway Engineering Association. The accompanying table gives typical hardness readings made on rails treated at the producing unit, which are considered representative of every-day practice.

**Typical Brinell Hardness Readings**
LONGITUDINAL SECTION

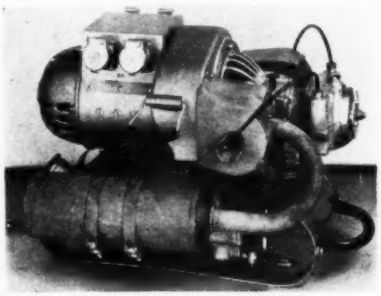
| Depth Below Surface | Distance from Hardened End | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | End Face | ¼" | ½" | ¾" | 1" | 1½" | 2" | 2½" | 3" |
| **1/16" | * | 375 | 375 | 375 | 363 | 331 | 277 | 277 | 277 |
| ⅛" | 375 | 375 | 375 | 363 | 352 | 311 | 262 | 269 | 269 |
| | 375 | 363 | 363 | 352 | 331 | 293 | 269 | 269 | 269 |
| ¼" | 375 | 352 | 321 | 321 | 302 | 277 | | | |
| | 352 | 321 | 311 | 302 | 293 | | | | |
| ⅜" | 331 | 311 | 293 | 285 | 269 | | | | |
| | 311 | 285 | 285 | 277 | | | | | |
| ½" | 293 | 269 | | | | | | | |
| | 269 | | | | | | | | |
| ⅝" | | | | | | | | | |

*Chamfering the rail end prohibits a hardness check here.
**Standard Brinell Readings—all others converted from Rockwell C.

*(For additional information regarding any of the products described on this page, use post cards, page 739)*

## Dual-Purpose Generator

THE Homelite Corporation, Port Chester, N.Y., has developed a portable dual-purpose generator which can be used to operate either high-cycle

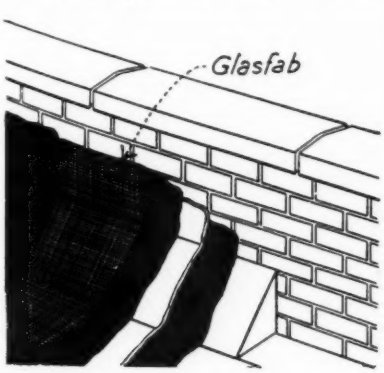


The Homelite dual-purpose generator

electric tools, such as chain saws, grinders, impact wrenches, nut runners and drills, or standard universal electric tools and floodlights. Driven by a Homelite 2-cylinder air-cooled gasoline engine, the generator has both a 230-volt, 180-cycle, 3-phase alternating-current output of 5,000 watts, and a standard 110-volt, direct-current output of 2,000 watts. In this generator the armature is keyed directly to the engine shaft without intermediate coupling. In overall dimensions the unit is 29½ in. long, 24 in. wide and 18 in. high. It weighs 175 lb. and is said to operate at full load for 1¼ hr. on a gallon of fuel.

## Waterproofing Fabric

THE Lexington Supply Company, Cleveland, Ohio, is introducing into the railroad field a new inorganic waterproofing membrane fabric, made




Showing how Glasfab is applied in the flashing at a parapet wall

of Fiberglas, for the reinforcement of materials used in waterproofing roofs, parapet walls, foundation walls, bridge abutments and similar structures. Known as Glasfab, the new material is a mesh made wholly of glass. Hence, it is pointed out, the fibres of the fabric are impervious to dampness and, consequently, are free from rot or decay. For this reason, it is said, the strength of the fabric is maintained throughout the life of the application.

The fibres are claimed to be strong and durable and to resist the "wear and tear" that is caused by the expansion and contraction of the surface to which the material is applied. Glasfab is said to be unaffected by heat up to a temperature of 1,000 deg. F., and does not, therefore, "char" under the application of hot tar or asphalt. Because the fibres are inorganic there is claimed to be no capillary or "wicking" action. Thus, it is said, no volatile oils are carried to the surface to escape and dry out the waterproofing compound, and no moisture is conducted into the compound.

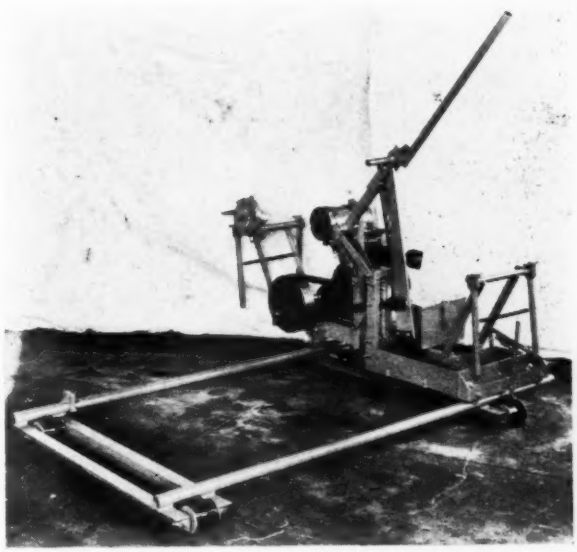
Glasfab is applied by the same procedure used in applying any membrane waterproofing and under any standard membrane specification. It is said that it can be used with any accepted waterproofing compound. It is available in roll widths ranging from 2 in. to 36 in. and weighs only 2.2 oz. per sq. yd.

## Improved Tie Cutter

THE Woolery Machine Company, Minneapolis, Minn., has now made its Model N Tie Cutter available with an undercarriage by means of which the cutter can be moved transversely across the track from one rail to the other. Thus, each tie to be removed can be cut inside the rail on both sides of the track with a single spotting of the unit, or if desired, a limited number of ties can be cut on one side, followed by the second cut on the opposite side, without the necessity of turning the machine around.

The undercarriage consists of a rectangular frame mounted on four rollers, two of which rest on each rail. The longitudinal member at each end of the frame consists of two angle irons supported on the axles of the rollers. The transverse members of the frame consist of two lengths of steel tubing that form a track on which the tie cutter operates by means of rollers.

The tie-cutting unit consists of a cutting blade reciprocated by an eccentric crank which is belt driven by a three-horsepower, air-cooled gasoline engine. The cutting blade is raised or lowered by a hand-operated lever arm. An integral part of the unit is a blade sharpening attachment which consists of a grinding wheel operated from the pulley of the engine.



The Woolery Model N tie cutter with undercarriage

## Air-Powered Generator

THE Ingersoll-Rand Company, New York, has developed a lightweight air-powered generator for lighting purposes, which can be used for illuminating night work in any situation requiring the operation of an air compressor. Known as the AL-150 Airlite, this generator will supply enough current to operate two 75-watt, 110 or 220-volt light bulbs.

It is constructed in such a way, it is said, that it cannot be harmed by

*(For additional information on any of the products described on this page, use postcards, page 739)*

short circuits or overloads. If by accident the output terminals are shorted, light is restored instantly when the short is removed. As fur-

One of the new Ingersoll-Rand air-powered lighting generators

nished, the generator is equipped with a handle, a connector plug and 8 ft. of 5/16-in. hose with fittings, which serves as the connection to the air supply. Its dimensions are 7¼ in. by 5 in. by 5 in. (without handle), and its weight is 8¾ lb.

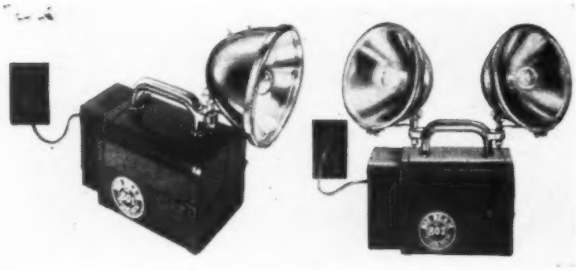
## Auxiliary Lamps

THE U-C Lite Manufacturing Company, Chicago, has announced two new Big Beam auxiliary lamps for emergency use when regular lighting circuits fail. One of these is known as the Single-Head Model No. 801 and the other as the Dual-Head Model No. 802.

The new lamps, operating on four dry-cell batteries, are connected to regular lighting circuit outlets by extension cords. The extension cord, in turn, is attached to a relay unit which is an integral part of each lamp. When a failure occurs in the regular lighting circuit, the relay units act in reverse and automatically switch on the auxiliary lamps. When in operation they are said to project light beams of 2,000 ft., or, if equipped with a flood-light snap-on lens, will diffuse the light.

When desired the extension cord can be removed from the wall outlet and placed in a space provided in the relay housing compartment located on the rear side of each lamp container. The auxiliary lamps then become regular portable electric hand lamps which can be switched on or off at will.

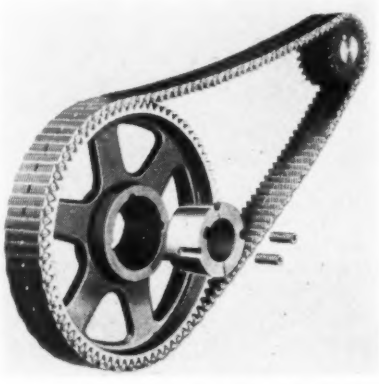
The lamp containers, equipped with aluminum handles, are of 20-gage sheet steel with a baked enamel finish. The lamp heads, chromium plated, can be turned through 360 deg.



Left—The Big Beam Single-Head Model 801 auxiliary lamp and the Dual-Head Model 802

## Silent-Chain Drives

IN view of the new industrial-standard tooth form adopted by manufacturers of the chain-drive type of power transmission, the Link-Belt Company, Chicago, has announced that it has developed a line of silent-chain drives, available from the stock shelves of Link-Belt distributors and factory branch stores, that will operate on sprockets cut to the new standard. Further, it has announced that the Link-Belt silent-chain sprockets will fit the new industrial-standard silent chain.



One of the Link-Belt industrial-standard silent-chain drives available from stock

As a result of these developments, the Link-Belt line, it is said, has been made universally interchangeable. The new silent-chain drives are available in the middle-guide type in two pitch sizes: ½ in.—in width ranging from ¾ in. to 3½ in.; and ¾ in.—in widths from 2 in. to 5 in.

Another item available from stock is a taper-lock bushing, tapered for easy assembly into a taper-bored sprocket hub. It is said to fit tightly on the shaft and to be easy to remove; no reboring is necessary. Still another item carried in stock is an all-steel pinion with hardened teeth and a 1⅛ in. long hub on one side, with finished bores for standard N.E.M.A. frame motor-shaft diameters, complete with keyway and set screw.

## Protective Coating

SIKA Chemical Corporation, Passaic, N. J., is now offering a new protective coating for concrete, masonry, wood or metal, which is known as Sika Seal. Black in color, this material is applied by brush and hardens to form a film which is said to be tough and durable and to seal pores and hair-line cracks, thus preventing the penetration of water or dampness.

For best results, it is recommended that the surface be clean and free of all foreign matter. Concrete or mortar should be etched with acid and then wire brushed. Loose rust and scale should be removed from metal surfaces. The manufacturer recommends that, in applying Sika Seal, the first coat be rubbed in well to seal all pores. Several thin coats are said to be desirable, allowing each coat to dry before applying the next. It is said that, when necessary, the material can actually be applied successfully under water.

Demonstrating How Sika Seal Can Be Applied Under Water

*(For additional information regarding any of the products described on this page, use post cards, page 739)*

*"there's nothing more important to railroads than Safety!"*

**SAFETY MUST KEEP PACE WITH INCREASED SPEED AND HEAVIER TRAINS . . .**

That's why more and more roads are joining the safety-conscious users of Verona *Fixed* Tension Triflex Springs. They have the *highest* reactive value of any spring washer — and the principle of *fixed* tension assures the means of applying *equal* as well as adequate tension to *all* bolts.

**VERONA *Fixed* TENSION TRIFLEX SPRING**

**WOODINGS VERONA TOOL WORKS**

**VERONA, PA. • CHICAGO, ILL.**

# THE MONTH'S NEWS

## Happenings among the railways—the associations—the suppliers

### Chicago Railroad Fair

Various construction projects totalling some $2,000,000 are nearing completion at the 50-acre site of the railroad fair to open in Chicago on July 20, and to close on Labor Day, September 6. Projects on which the work is well along, if not already complete, includes the grandstand for the "Wheels-A-Rolling" pageant, and the 450-ft. stage for this spectacle.

In addition, the Chicago & North Western has finished its exact scale replica of Chicago's first depot, and the joint exhibit of the Burlington Lines, the Great Northern and the Northern Pacific is being prepared on a 1½-acre site. This exhibit will include a functioning replica of "Old Faithful," live bears, authentic Indian tepees, totem poles and stage coaches. The Illinois Central is preparing a street scene and patio depicting the old French quarter in New Orleans, La., as it exists today, and the Chicago, Rock Island & Pacific will present scenes of the southwest in its "Rocket Village", and will display two of its modern passenger cars, "La Fiesta", a club diner, and "La Mirada", an observation sleeper.

The Union Pacific is readying an exhibit designed to take fair visitors on a mythical tour of vacation lands in the states served by that road. The exhibit of the Pullman Company will include a display of exact replicas of its latest and most modern sleeping car accommodations, with Pullman porters on hand to demonstrate the functioning of each.

### Railroads Face Demands for Increased Wages

The railroads of the country are now actually or potentially confronted with pay demands covering practically all of their organized employees. On April 10, 16 non-operating railroad unions served formal notice on the individual carriers of a combined demand for reduction of the work week from 48 to 40 hr., without any reduction in straight-time earnings from the existing basis, plus an increase of 25 cents in the rate of pay per hour, to be effective May 10. These unions are also seeking other concessions involving overtime pay for work on Saturdays, Sundays and Holidays.

In addition, following a meeting on June 14 of the Executive Wage committee of the Order of Railway Conductors and the Brotherhood of Railroad Trainmen the announcement was made that these unions have voted to serve demands on the railroads on July 1, for a 25-per cent wage increase, to become effective August 1. Demands for a number of changes in working rules are also under contemplation. Remaining unresolved, at the time of going to press, were the efforts of the three "hold out" operating unions to over-ride the recommendations of an emergency board to the effect that their members accept some changes in working rules and the same 15½-cents per hour wage increase that was accepted by unions representing other employees. The unions involved are the Brotherhood of Locomotive Engineers, The Brotherhood of Locomotive Firemen and Enginemen, and the Switchmen's Union of North America. As a result of a strike threat by these unions the railroads are being operated by the federal government and the unions have been prevented from striking by court action.

### Railway Purchases Rise In First Quarter

During the first quarter of the year, railways of the United States made purchases of materials, supplies and equipment totalling $756,501,000, an increase of $114,000,000, or 18 per cent, over the equivalent period of 1947, which was a record year from the standpoint of such purchases. Orders for equipment alone during this period totalled $223,971,000, an increase of 23 per cent as compared with the orders placed in the first quarter of 1947. Purchases of rail in the first quarter of this year amounted to $23,249,000, an increase of 8 per cent over the same period last year, although crosstie purchases decreased 34 per cent to $15,815,000.

## Changes in Railway Personnel

### General

**Charles McDiarmid,** chief engineer of the Georgia & Florida, with headquarters at Augusta, Ga., has been appointed operating officer.

**James P. Newell, Jr.,** general superintendent of the Eastern Pennsylvania division of the Pennsylvania, with headquarters at Harrisburg, Pa., and formerly a division engineer on that road, has been appointed general manager of the Western region, with headquarters at Chicago. **Allen J. Greenough,** superintendent of the Maryland division at Baltimore, Md., and an engineer by training and experience, succeeds Mr. Newell, and **T. E. Boyle,** superintendent of freight transportation of the Western region at Chicago, and former division engineer, replaces Mr. Greenough at Baltimore.

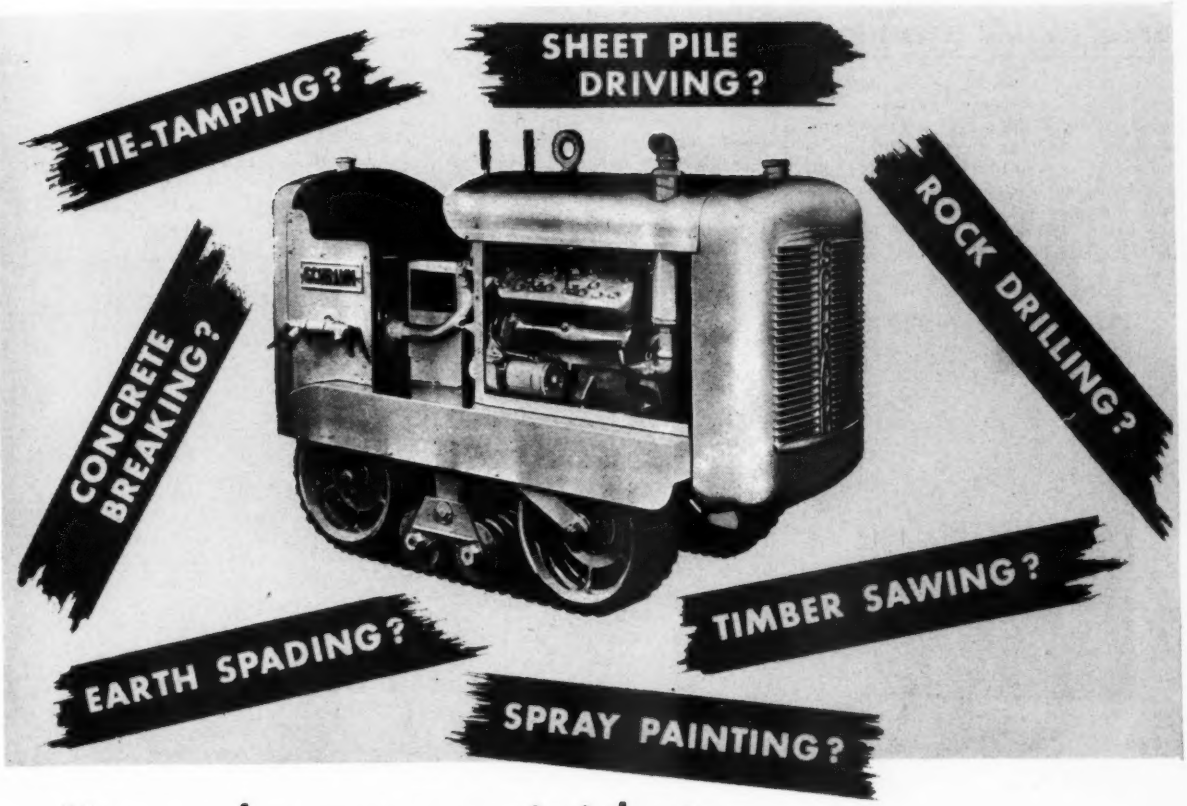
**J. C. White,** vice-president in charge of the New York Zone of the Pennsylvania, with headquarters at New York, and an engineer by training and experience, has been advanced to vice-president in charge of purchases, stores and insurance of the system, with headquarters at Philadelphia, Pa. He is succeeded by **H. H. Pevler,** general manager of the Central region at Pittsburgh, Pa.

Mr. White, a native of Huntingdon, Pa., and a graduate of Pennsylvania State College in civil engineering, entered the service of the P.R.R. in 1912 as a chainman. He subsequently had extended experience in many areas of the road as assistant supervisor, supervisor, division engineer and superintendent. During 1933 and 1934 he was superintendent of the Philadelphia Terminal division, and later superintendent of freight transportation of the Eastern region at Philadelphia. He

J. C. White

also served as superintendent at Terre Haute, Ind., and Pittsburgh. Mr. White became general manager of the Western region at Chicago in 1935 and transferred to the Central region at Pittsburgh in 1939. He was promoted to vice-president at New York on February 1, 1946.

(*Continued on page 732*)




## ...Yes, and many non-air jobs too

# SCHRAMM'S MODEL 60 CRAWLER *does them all*

## *because it goes where the work is*

Any machine is a better machine if it does a number of jobs. For an investment lying idle eats profits; a busy one earns profits.

That is why the eyes of maintenance men light up when they see Schramm's new Model 60 Crawler. Unlike specialized compressors suitable only for tie tamping, its crawler treads take it anywhere to do rock drilling, sawing, sheet pile driving, spray painting, and many other compressed air jobs. But even these do not end its usefulness. Provide the Model 60 Crawler with suitable attachments and it becomes a light tractor for backfilling, mowing, etc. And with a power take-off it runs machinery as well.

You will want bulletin FC 48 giving all the facts about Schramm's Model 60 Crawler. Write the Railway Sales Division for your copy today.

### These features make the Model 60 Crawler a great compressor

Capacity 60 cubic feet per minute actual air at 100 pounds p.s.i. Perfect for four tampers or other tools.

Motor-driven crawler treads to position compressor anywhere, on or off the track.

Easily self-loaded on rail dolly, trailer, or truck for fast transportation to the job.

Unique, compact power plant. Both the motor and the compressor cylinders are balanced in a V-8 block.

Push button starting.

Simple driving controls. Complete maneuverability.

Quickly adaptable to such general purposes as towing, backfilling, and operating stationary machinery (saws, pumps, etc.)

Famous Schramm dependability that comes from 40 years of experience building portable compressors.

**SCHRAMM INC.** THE COMPRESSOR PEOPLE WEST CHESTER PENNSYLVANIA

## Railway Personnel (Cont'd)

Mr. Pevler, a native of Waynestown, Ind., and a graduate of Purdue University, entered the service of the Pennsylvania in 1927 as an assistant on the engineers' corps in Philadelphia. He subsequently had extended experience in many areas of the railroad as assistant supervisor, supervisor, division engineer and superintendent. He became superintendent of freight transportation at Phila-

H. H. Pevler

delphia in 1940 and was later superintendent of the Philadelphia Terminal division. In 1942 he was appointed general superintendent of the Eastern Pennsylvania division at Harrisburg, Pa., and from that post advanced to general manager of the Western region at Chicago in January, 1946. Mr. Pevler has been general manager of the Central region at Pittsburgh since October 16, 1946.

**J. P. Kiley,** vice-president of the Chicago, Milwaukee, St. Paul & Pacific, with headquarters at Seattle, Wash., and an engineer by training and experience, has been elected vice-president—operations,

J. P. Kiley

with headquarters at Chicago. Mr. Kiley was born at Chicago on August 13, 1895, and is a graduate of Villanova college. He entered railway service in 1915 as a rodman on the Milwaukee, later being promoted to assistant valuation engineer, with headquarters in Chicago. He served in the latter capacity until 1930, except during the period covering World War I when he was in the armed forces. In 1930 Mr. Kiley was advanced to engineering assistant to the chief financial and accounting officer at Chicago, and in 1940 he was further advanced to special representative of the chief operating officer, with the same headquarters. One year later he became auditor of investment and joint facility accounts, and in 1943 he was promoted to assistant to the general manager. Mr. Kiley was advanced to assistant general manager at Chicago in 1943, to assistant to president at Seattle, Wash., in 1946, and to vice-president at the latter point in May, 1947. He was serving as vice-president at Seattle at the time of his recent advancement.

### Engineering

**W. L. Hartzog, Jr.,** whose appointment as principal assistant engineer on the Atlantic Coast Line, with headquarters at Wilmington, N.C., was reported in the May issue, was graduated from the University of South Carolina with a degree in civil engineering and entered the service of the Atlantic Coast Line in 1926 as a draftsman in the bridge department,

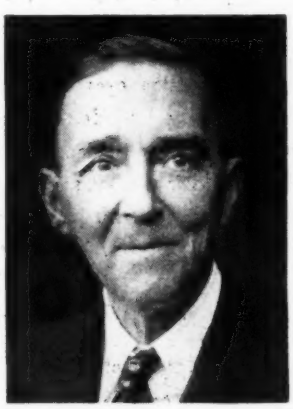
W. L. Hartzog, Jr.

office of the chief engineer, at Wilmington. He was subsequently advanced to junior engineer, senior assistant engineer, and engineer of design, leaving the latter post in 1942 to accept a commission as captain in the 703rd Railway Grand Division, the A.C.L.-sponsored unit of Military Railway Service. He was promoted to major in July, 1943, and appointed chief of maintenance, engineer bridges and buildings, headquarters 1st Military Railway Service, and served in North Africa, Italy, and Eastern France until December, 1944, when he was injured, relieved of assignment, and returned to the states for hospitalization. At the time of his separation from the service he held the rank of lieutenant-colonel, Corps of Engineers. Mr. Hartzog returned to the A.C.L. on March 1, 1946, as assistant engineer bridges, which position he held until his recent promotion.

**R. H. Carpenter,** assistant division engineer on the Missouri Pacific, with headquarters at Kansas City, Mo., has been promoted to division engineer at Poplar Bluff, Mo., to succeed **F. R. Woolford,** who has been appointed assistant superintendent. **R. J. Bruce,** assistant engineer at St. Louis, Mo., has been advanced to assistant division engineer at Kansas City to succeed Mr. Carpenter, and **W. E. Laird** has been appointed assistant engineer at St. Louis in place of Mr. Bruce. **J. M. Giles** has been appointed assistant engineer, with headquarters also at St. Louis, to succeed **G. R. Westcott,** who has retired.

**Charles L. Towle,** whose appointment as assistant division engineer in the office of the chief engineer of the Pennsylvania, with headquarters at Philadelphia, Pa., was noted in the May issue, was born at Haddon Heights, N.J., on May 2, 1913, and was educated at Lehigh university, receiving the edgree of Bachelor of Science in civil engineering in 1935. He entered the service of the Pennsylvania in October, 1936, as an engineer apprentice, and in February, 1939, he was appointed rodman, serving in this capacity at various locations until April, 1940, when he was advanced to assistant supervisor, with headquarters at New York. In October, 1942, Mr. Towle was promoted to supervisor on the Pennsylvania-Reading Seashore Lines, at Camden, N.J., and in May, 1945, he was transferred to Dennison, Ohio, where he was stationed at the time of his recent appointment as assistant division engineer.

**Harold R. Bausch,** whose appointment as principal assistant engineer of the Jersey Central lines at Jersey City, N.J., was noted in the June issue, was born on April 11, 1892, at Farmingdale, N.Y. Mr. Bausch entered railroad service in June, 1910, with the Long Island, serving as transitman until 1914. He went with the Jersey Central Lines on May 28, 1915, as transitman in the engineering department, becoming principal draftsman in that department on August 1, 1924. On



Harold R. Bausch

March 16, 1930, Mr. Bausch was appointed assistant engineer in the maintenance of way department, transferring to the engineering department on June 16, 1934, where he remained until his recent appointment as principal assistant engineer.

(*Continued on page* 734)

CENTRAL OF GEORGIA

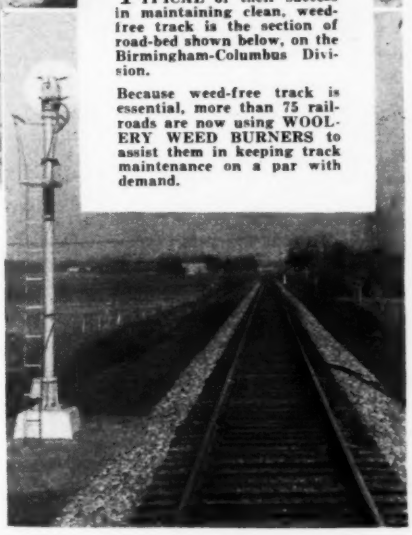
Essential

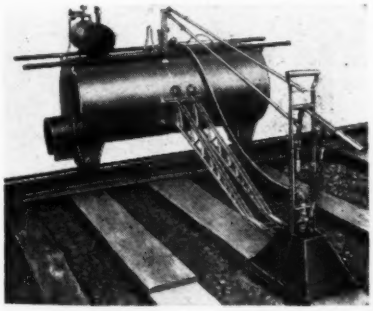
Yes, *"Essential"* is the word for clean, weed-free track in relation to modern high-speed trains such as the Central of Georgia's Dixie Flyer, City of Miami, Southland, Seminole Limited, and Dixie Limited. The Central of Georgia uses 16 WOOLERY WEED BURNERS to keep roadbeds free of vegetation the economical way.

Essential also in the Central of Georgia's maintenance work is the economy and efficiency of modern machines, such as WOOLERY CREOSOTE SPRAYERS, which help to do a proficient job of treating freshly-adzed ties at a minimum cost of time and labor.

TYPICAL of their success in maintaining clean, weed-free track is the section of road-bed shown below, on the Birmingham-Columbus Division.

Because weed-free track is essential, more than 75 railroads are now using WOOLERY WEED BURNERS to assist them in keeping track maintenance on a par with demand.





**WEED BURNERS**

Railroad cost records show that weeds are destroyed at lower cost by using weed burners than by any other method. Available in 5-burner, 3-burner, 2-burner and 1-burner models.

**CREOSOTE SPRAYERS**

Two men operating this machine can do a safer, quicker, better job of creosoting newly-adzed ties than could a whole crew by old-fashioned methods.

**WOOLERY TRACK MAINTENANCE UNITS**

**Tie Cutters Weed Burners Creosote Sprayers**

**WOOLERY MACHINE COMPANY**

MINNEAPOLIS Pioneer Manufacturers of MINNESOTA

RAILWAY MAINTENANCE EQUIPMENT

RAILWAY WEED BURNERS • MOTOR CARS • TIE CUTTERS • TIE SCORING MACHINES • RAIL JOINT OILERS • CREOSOTE SPRAYERS • BOLT TIGHTENERS

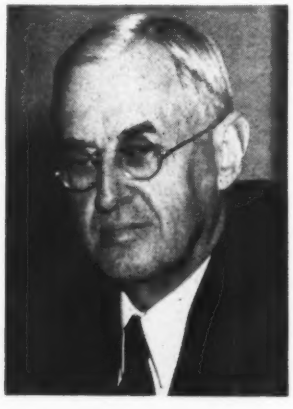
EXCLUSIVE EXPORT REPRESENTATIVES: PRESSED STEEL CAR COMPANY, INC., PITTSBURGH, PENNA.

## Railway Personnel (Cont'd)

**Arthur B. Stone,** assistant chief engineer of the Norfolk & Western, has been promoted to chief engineer, with headquarters as before at Roanoke, Va.,

Arthur B. Stone

succeeding **W. P. Wiltsee,** who has retired after 47 years of service with that road. **W. L. Young,** principal assistant engineer, succeeds Mr. Stone as assistant chief engineer, with headquarters as before at Roanoke. **James Y. Neal,** assistant engineer at Norfolk, Va., has been promoted to principal assistant engineer at Roanoke, succeeding Mr. Young. **John**



W. P. Wiltsee

**F. Newsom, Jr.,** assistant engineer of buildings at Roanoke, succeeds Mr. Neal as assistant engineer at Norfolk. **Charles E. Lex, Jr.,** a draftsman, has been advanced to assistant engineer of buildings.

Mr. Stone was born at Roanoke on August 21, 1890. He began his career in 1906 with the Virginia Bridge & Iron Co. and went with Milliken Brothers, Staten Island, N.Y., in 1910 and with Post & McCord, New York, in 1911. He entered the service of the Norfolk & Western as a bridge draftsman on July 29, 1912, and was promoted to chief structural draftsman in February, 1929, and to bridge engineer in November, 1930. Mr. Stone was appointed assistant chief engineer on October 1, 1941, which position he held until his recent promotion.

Mr. Wiltsee was born at Cincinnati, Ohio, on May 30, 1878. After serving from 1895 until 1900 as rodman and transitman and on various jobs, including government river and harbor surveys, Mr. Wiltsee entered railroad service in the latter year as resident engineer on construction of the Cincinnati, Portsmouth & Virginia Belt Line at Cincinnati, Ohio. When the latter road was purchased by the Norfolk & Western in April, 1901, Mr. Wiltsee became a draftsman for the N. & W. at Roanoke, being promoted to chief draftsman for branch lines at Radford, Va., eight months later. He was promoted to assistant engineer, branch lines, in July, 1902, transferring to Norfolk in March, 1912. From 1916 to 1923 Mr. Wiltsee was in charge of engineering in connection with maintenance of way, water supply and fuel stations over the

W. L. Young

entire system. He became acting chief engineer on February 16, 1923, and was appointed chief engineer on January 1, 1924, which position he held until his retirement.

Mr. Young was born at Rocky Mount, Va., on July 20, 1901, and was employed as a draftsman with the Virginia Bridge

James Y. Neal

Company from 1919 to 1921 and as construction engineer by the Atlantic Bridge Company from 1921 to 1924. He entered railroad service in 1924 as draftsman with the Norfolk & Western, becoming crossing engineer in October, 1930; bridge engineer on October 1, 1941, and principal assistant engineer on December 1, 1945. Mr. Young held the latter position until his recent promotion to assistant chief engineer.

Mr. Neal entered the service of the Norfolk & Western as a chainman in February, 1912, later working as a rodman and transitman. In December, 1918, he was promoted to assistant resident engineer and four years later was advanced to resident engineer at Williamson, W. Va. He was transferred to Norfolk, Va., in October, 1934, and promoted to assistant engineer, with jurisdiction over the Norfolk terminal and the Norfolk division, on March 1, 1940, serving in this capacity at the time of his recent promotion to principal assistant engineer.

**Ben H. Goodwin,** assistant division engineer of the Southern at Atlanta, Ga., has been appointed division engineer at Valdosta, Ga., succeeding **John A. Walker,** who has retired after 46 years of service.

**K. L. DeBlois,** designing engineer of the Lake Front Dock & Railroad Terminal Co., with headquarters at Toledo, Ohio, has been appointed assistant engineer of bridges on the New York Central, at Chicago.

**Jack W. Buford,** whose appointment as division engineer of the Pennsylvania, with headquarters at Logansport, Ind., was reported in the May issue, was born at Topeka, Kan., on July 22, 1912, and was graduated from the University of Wash-

Jack W. Buford

ington in 1933 with a Bachelor of Science degree in civil engineering. In 1934 he received an M.S. degree from Harvard university, and entered the service of the Pennsylvania in August of that year as an assistant on the engineer corps. From 1937 to 1941 he served successively as assistant supervisor of track and supervisor of track at various locations, being furloughed in December of the latter year to enter military service. On his return to the Pennsylvania in February, 1946, Mr. Buford was appointed supervisor of track at Jamaica, N.Y., and a year later he was advanced to assistant division engineer at Philadelphia, Pa. In July, 1947, he was transferred to Harrisburg, Pa., where he was stationed at the time of his recent promotion.

(*Continued on page* 736)

# "THIS YEAR—WE TAKE THE WEEDS or THE WEEDS TAKE THE RAILROAD"

THIS crisp note was sent up to the VP who held the purse strings for a large system. The man who sent it was a two-fisted railroader who knew what he needed and he sent the message to his boss in no uncertain words.

Phone call—"GET DOWN HERE FAST."

The big boss was on the spot and demanded amplification.

"We had a track back in 1939 where weeds were a forgotten problem. Our cost was under $25.00 per mile per year and the chemical was being applied to prevent new growth as there was little or nothing left to kill."

"Service provided by the Reade Company was denied to me. That was four years ago."

"Loss of this service has in my opinion cost this company millions of dollars. Labor costs have piled up. Weeds have not only made our track unsightly but they have interfered with essential track work."

"Weeds on our line are now out of control."

"O.K.—Get in touch with the Reade Company. I saw one of their spray trains last week as I was leaving St. Louis. They sure go to town."

* * *

Weed control is no task for a modern medicine man. It calls for years of experience, for the service of men who know the chemistry of weeds. Productive capacity must permit of rolling out strings of loaded tank cars on short notice. Spray trains must be big and fast. Waste effort cannot be tolerated.

If you have for any reason discontinued the use of weed killing chemical, it's a big mistake and you will soon recognize it as such.

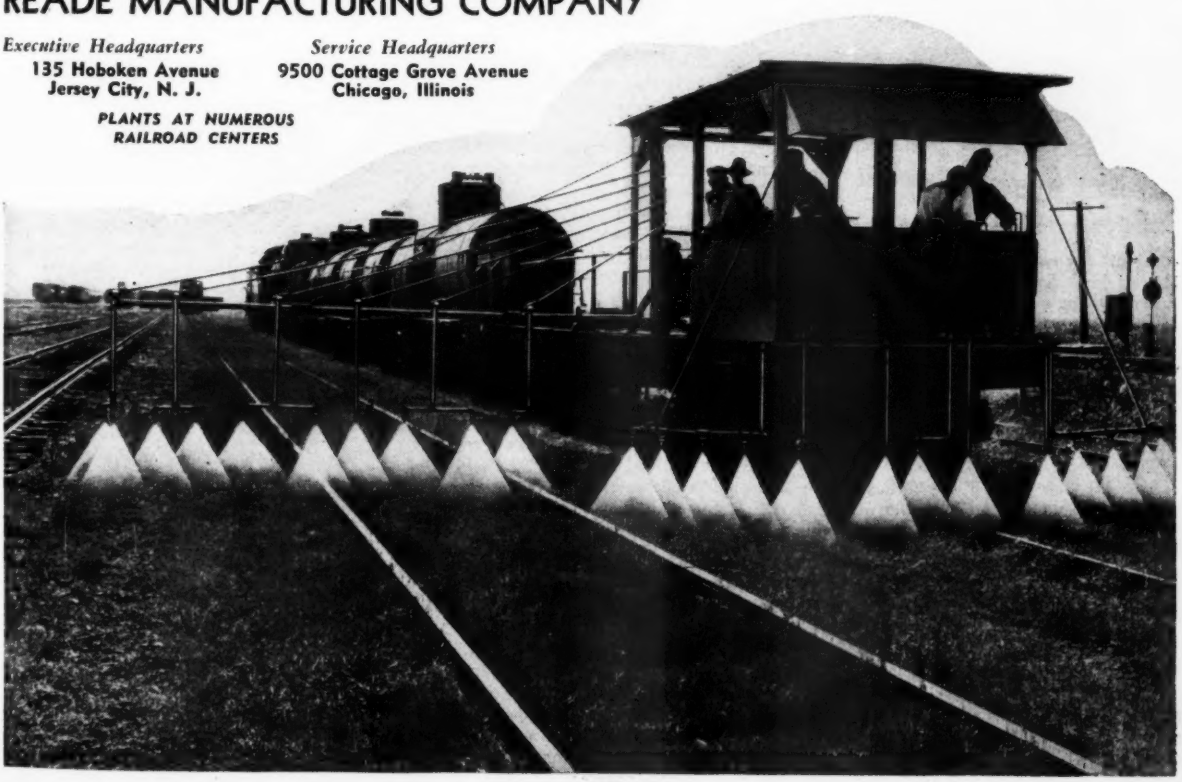
Let us have the facts relating to your weed control problem. We can give you action that will surprise you.

## READE MANUFACTURING COMPANY

*Executive Headquarters*
135 Hoboken Avenue
Jersey City, N. J.

*Service Headquarters*
9500 Cottage Grove Avenue
Chicago, Illinois

*PLANTS AT NUMEROUS RAILROAD CENTERS*



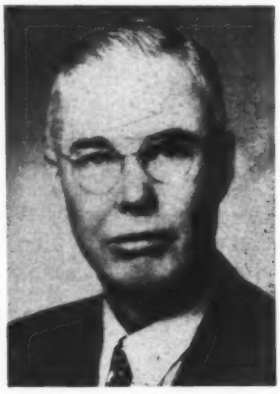
## Railway Personnel (Cont'd)

**W. J. Jones,** roadmaster on the Southern Pacific, at Los Angeles, Cal., has been promoted to assistant division engineer, with headquarters at Ogden, Utah.

**Alex Manson,** assistant engineer in the miscellaneous department of the chief engineer's office, Louisville & Nashville, at Louisville, Ky., has been appointed assistant division engineer at Ravenna, Ky., a newly created position.

**E. L. Hoopes,** assistant to the chief engineer maintenance of way of the Central region of the Pennsylvania, with headquarters at Pittsburgh, Pa., retired recently.

**W. G. Dyer,** whose promotion to district engineer on the Canadian Pacific, with headquarters at Vancouver, B.C., was announced in the May issue, entered railway service as a rodman on the Canadian Pacific at Regina, Sask., while attending the University of Saskatchewan. He graduated in 1928 and entered the service of the Canadian Pacific on a permanent basis as a building inspector, with headquarters at Saskatoon, Sask. Mr. Dyer later served in various capacities at different points on the road and was subsequently appointed



W. G. Dyer

resident engineer, with headquarters at Moose Jaw, Sask. In 1941 he was advanced to division engineer at that point and, in 1943, was transferred to Penticton, remaining in that location until 1946, when he was promoted to engineer of track, with headquarters at Montreal, the position he held at the time of his recent promotion.

**W. F. Petteys,** who has been on leave of absence, has resumed his duties as division engineer of the Mahoning division of the Erie, with headquarters at Youngstown, Ohio. **P. L. Crowe,** acting division engineer of the Mahoning division, has resumed the duties of assistant division engineer of that division.

**O. T. Carroll,** assistant engineer of the Peoria & Pekin Union, at Peoria, Ill., has been appointed chief engineer, succeeding **R. E. Cooper,** who has resigned at his own request due to ill health. Mr. Carroll attended Bradley and Valparaiso Universities, where he studied engineering.

**Albert M. Zabriskie,** whose retirement as chief engineer of the Jersey Central Lines was reported in the June isue, was born at Nelson, N. H., on June 3, 1882, and engaged in municipal engineering at Plainfield, N.J., from 1899 to 1902. In January

Albert M. Zabriskie

of the latter year he entered railroad service in the engineering department of the Lehigh Valley, remaining with that road until June, 1904, when he went with the Central of New Jersey as transitman. Mr. Zabriskie was appointed assistant engineer in November, 1906; engineer of design in January, 1917; principal assistant engineer in October, 1917; assistant chief engineer in July, 1938; and chief engineer on April 1, 1944.

**T. H. Wilson,** assistant engineer on the Canadian National, has been appointed office engineer, with headquarters as before at Winnipeg, Man.

**T. F. Jones,** assistant valuation engineer of the Southern Pacific Lines in Texas and Louisiana, with headquarters at Houston, Tex., has been appointed valuation engineer and tax commissioner at that point, succeeding **John Lansdale,** who has retired after a railroad career of 42 years. Mr. Jones is succeeded by **D. C. Dayton,** assistant engineer. **William F. Sanders,** assistant engineer, has been appointed assistant valuation engineer, succeeding **C. N. Campbell,** who has retired after 43 years of service with the S.P.

### Track

**William H. Horner,** acting general roadmaster on the Terminal Railroad of St. Louis, has been appointed general roadmaster, with headquarters as before at St. Louis, Mo., to succeed **C. G. Parrish. Joseph T. Mersmann** has been appointed track supervisor, with headquarters at East St. Louis, Ill.

**Louis P. Bonfardin,** whose appointment as supervisor of track on the Pennsylvania, with headquarters at Carnegie, Pa., was noted in the June issue, was born at Byrnedale, Pa., on August 10, 1913, and entered the service of the Pennsylvania in March, 1936, as a trackman at Emporium, Pa. Mr. Bonfardin was appointed track foreman in August, 1940, and in March, 1942, was advanced to general track foreman, with headquarters at Erie, Pa. He was later transfered to Buffalo, N.Y., and in November, 1944, was appointed assistant supervisor of track at Derry, Pa., which position he was holding at the time of his recent promotion.

**Wilson A. Bump,** supervisor of track on the Boston & Albany, at Springfield, Mass., has retired after 49 years of service.

**C. A. McCully,** assistant supervisor of track on the Pittsburgh division of the Pennsylvania, with headquarters at Trafford, Pa., has been transferred to Cresson, Pa., also on the Pittsburgh Division, where he succeeds **R. L. Romberger,** who, in turn, replaces Mr. McCully at Trafford.

**R. J. Diener,** track supervisor on the Chesapeake & Ohio, Pere Marquette district, with headquarters at Saginaw, Mich., has been promoted to general supervisor, with the same headquarters, and **R. H. Gault,** track supervisor at Port Huron, Mich., has been transferred to Saginaw to succeed Mr. Diener. **John Moe,** assistant track supervisor, has been promoted to track supervisor, and **Lynn Cramer,** track foreman at Bay Port, Mich., has been advanced to assistant track supervisor, both with headquarters at Saginaw. **J. D. Newman** has been appointed acting supervisor of track, with headquarters at Peru, Ind.

**Richard E. Sampson,** acting track supervisor on the Boston & Maine at Lowell, Mass., has been appointed track supervisor of district No. 2, with headquarters at Greenfield, Mass., succeeding **John F. Malloy,** who died on April 24. **Romeo Lippe** has been made acting track supervisor at Lowell in place of Mr. Sampson. **W. H. Holland,** assistant bridge and building supervisor at Greenfield, has been appointed assistant track supervisor, with the same headquarters, succeeding **Donald S. Denio,** who has been assigned to other duties.

### Bridge and Building

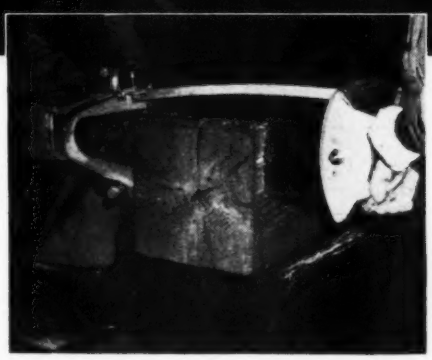
**Roger U. Simpter** has been appointed assistant bridge and building supervisor on the Boston & Maine, with headquarters at Greenfield, Mass., succeeding **W. H. Holland,** whose appointment as assistant track supervisor is reported elsewhere in these columns.

**George R. Collier,** whose appointment as general foreman bridges, buildings and water service on the Atchison, Topeka & Santa Fe, with headquarters at Dodge City, Kan., was noted in the June issue, was born on August 28, 1905, at Volwich, Kan., and received his higher education at Kansas State college, from which he received a Bachelor of Science degree in engineering in 1932. He entered the service of the Panhandle & Santa Fe (part of the Atchison, Topeka & Santa Fe System) in December, 1926, as a chainman at Amarillo, Tex., and subsequently served as rodman, transitman and assistant extra gang foreman until 1936 when he was appointed track inspector on new construction. He later served as building inspector and rodman, with headquarters

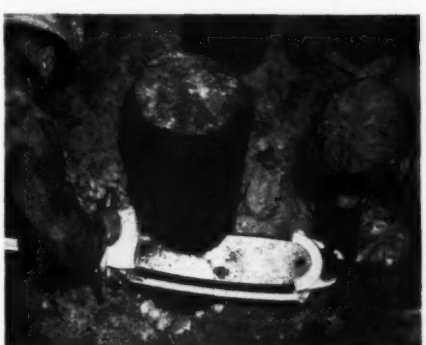
(*Continued on page* 738)

# Only 27 lbs.

## But Look at the Performance You Get



When very accurate cuts are necessary a helper's handle is easily attached to insure precise cuts at any angle.



Small, compact and easily handled, the Homelite Chain Saw gets in and cuts where larger saws are unworkable.

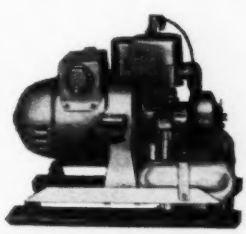
Here, for the first time, is a small saw that does the work of a big saw . . . a modern, high cycle electric chain saw that can be handled by one man with complete ease. Extremely fast and efficient, this saw cuts heavy timber and trees up to 36" diameter in amazingly low time. And because of its light weight . . . only 27 lbs. complete . . . it is easily operated no matter where your cutting is necessary.

*Another important point,* with a Homelite Chain Saw you get *electric* chain saw efficiency everywhere . . . even in remote locations . . . for you operate your Homelite Chain Saw with a Homelite Dual Purpose Generator, a *carryable* generator that can be picked up and easily transported to any job at any location.

### *Your Power Unit For a Plus Performance*

A Homelite Dual Purpose Generator is really a *multi-purpose* generator. You can use it not only for your Homelite Chain Saw but for operating both high cycle and standard universal 110 volt tools plus floodlights on emergency night work.

See how this is done. Write, today, for our new Homelite Chain Saw bulletin.



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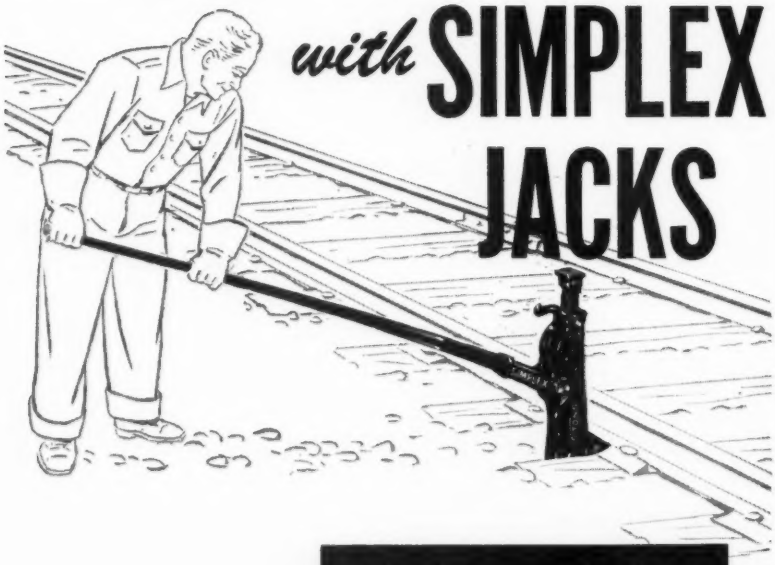
# You Take Full Advantage of THE LOW COST OF LIFTING with SIMPLEX JACKS



**SAVE TIME . . . SAVE WORK ON EVERY MAINTENANCE JOB**

**Simplex Single and Double Acting Track Jacks**
Lift full Capacity on Cap or Toe; Short fulcrum center for easier lifting; safety thumbguard, larger striking surface. Seven Models — all 15 Ton Capacity.

Virtually every Maintenance-of-Way job requires moving or shifting of heavy equipment and material. Top jacking efficiency on the job helps you get more work done, easier and faster . . . lets you achieve important time, money and manpower savings.

With Simplex Jacks and other maintenance equipment these are savings you can depend on—day after day—to help you reduce overall maintenance costs. Efficiency is built right into every Simplex Jack, along with the durability, ease of operation and safety that have made Simplex by far the preferred Jack in the railroad field.

**Simplex Bridge Jacks**
Mechanism is at the top of the Jack; broad toe lift has minimum height of 4⅜".

**Simplex Journal Jacks**
High capacity; easy lifting; light in weight; easy to operate.

**Simplex G-Y Tie Spacer**
Saves ties from being sledged; reduces man-hours in straightening ties.

**Simplex Rail Pullers and Expanders**
Enable one man to replace rail pounding crew.

**Simplex Track Shifter**
Solves High Speed Main line track shifting problems. Used in sets of two with Simplex Track Jacks.

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**Jacks**

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## Railway Personnel (Cont'd)

at Amarillo, until March, 1941, when he entered military service, being commissioned a captain in anti-aircraft artillery. Following his return to the Santa Fe, Mr. Collier was appointed roadmaster in December, 1946, with headquarters at San Angelo, Tex., which position he was holding at the time of his recent promotion.

### Special

**R. S. Sabins,** general foreman maintenance of way on the Central Vermont, has been appointed supervisor of equipment and welding, with headquarters as before at St. Albans, Vt.

### Obituary

**Charles D. Yarbrough,** retired chief tie and timber agent of the Atlantic Coast Line, died on May 11.

**Harry A. Tate,** retired chief scale inspector of the Norfolk & Western, died on March 23.

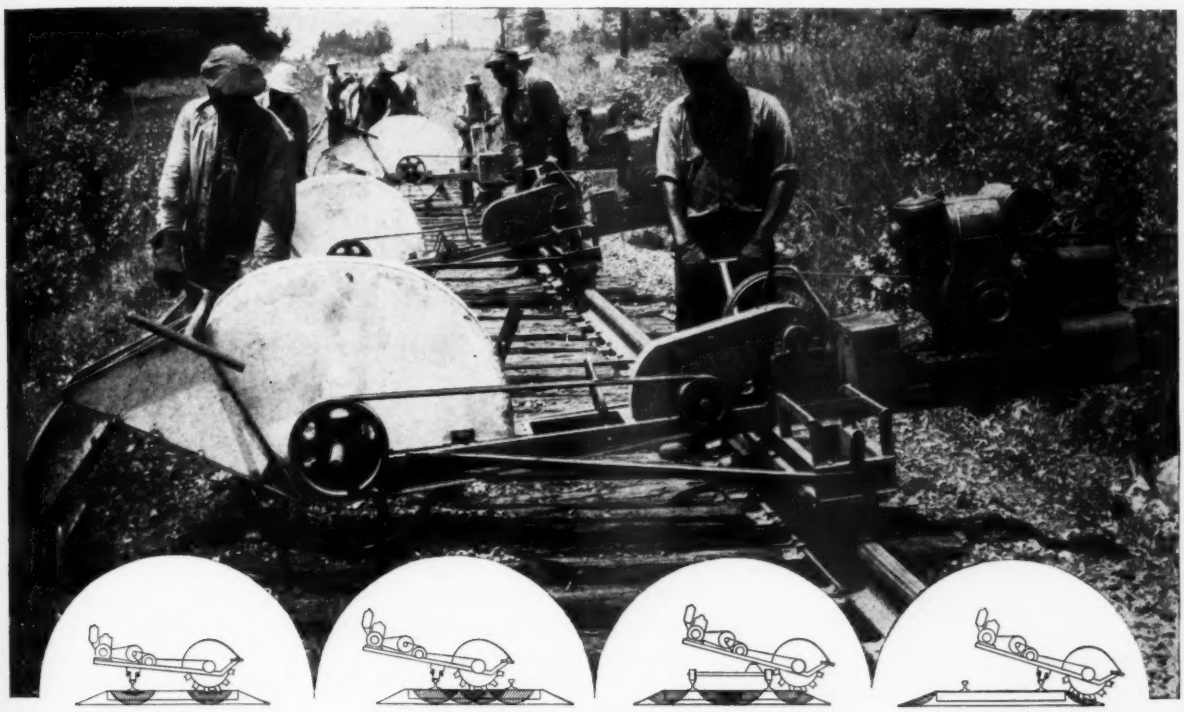
**William H. Rochester,** chief engineer of the Gulf, Colorado & Santa Fe, whose death was noted in the June issue, was born in Pendleton, S.C., on Feb. 1, 1891,

William H. Rochester

and received his higher education at Porter Military academy in Charleston, S.C., and at Clemson college. He began his railroad career as a draftsman with the Nashville, Chattanooga & St. Louis in 1915, and in October of that year he went to work for the Santa Fe as a chainman at Arkansas City, Kan. He served in various engineering capacities until April, 1926, when he became assistant engineer in charge of construction, with headquarters at Chicago. In May, 1930, he was appointed construction engineer, in which capacity he served until August, 1937, when he was promoted to district engineer at Amarillo, Tex. He held the latter post until June, 1943, at which time he became assistant chief engineer of the Santa Fe Coast Lines, with headquarters in Los Angeles, Cal. In October, 1946, Mr. Rochester was appointed acting chief engineer of the G. C. & S. F.

(Please turn to page 742)

# 2 Kershaw Kribbers on trial one season put 10 on Trackwork the next!





1. RELAYING — Kershaw Kribbers remove ballast to a depth of 4 inches below top of ties—sweep tie clean for adzer in same operation.



2. STRIPPING — while Relaying — Kershaw Kribbers can be used to completely remove ballast between ties and under removed rail . . . fast and thoroughly.



3. STRIPPING with rails in place—or cleaning out between tie ends ahead of ballast cleaners or retimbering side.

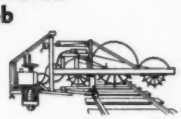


4. CLEANING OUT TIE ENDS ahead of ballast cleaners—Kershaw Kribbers make sure of a clean, efficient job.

## 4 Important Trackwork Jobs for Kershaw Kribbers

**Kershaw Equipment Designed and Proved on the Job**

Kershaw Three-Wheel Kribber



Kershaw Ballast Plow and Track Dresser

Kershaw Spike Setter Carriage

Kershaw Utility Derrick (2,000 lb. capacity)

TWO Kershaw Kribbers on trial by a large midwestern railroad showed a cost saving of 60% or more over hand methods on cribbing out ahead of adzers during relaying. . . . Trackwork performance that now has *twelve* Kershaw Kribbers at work on this road!

This is a typical experience with railroads and trackwork contractors who keep close account of trackwork costs—and who are also concerned with speed and quality of work done.

An example of Kershaw Kribber efficiency are the 5,240 cribs made in one day with two of these machines! One railroad contractor estimates savings in relaying with his Kershaw Kribbers in excess of 200 man-hours per mile!

Built by a railroad contractor to save cost on his own jobs, Kershaw Kribbers are available on a trial-rental basis to prove their value on every trackwork job. Write today for detailed data and more cost-savings figures!

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Rust-Oleum can be applied directly to any rusting surface—after easy, time-saving preparation. *It outlasts ordinary materials two to ten times*, depending on conditions. For lasting satisfaction and extra profits specify Rust-Oleum on new and re-built cars . . . and out on the right-of-way where rust is costly.

*Write for full information TODAY. Ask for Catalog No. 145.*

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**IT GOES ON FASTER**
Rust-Oleum saves 25% of the time normally required for application . . . and covers up to 30% more area.

**IT CUTS PREPARATION**
No sandblasting, flame cleaning or chemical rust "dissolvers" are required. Merely wirebrush to remove scale, dirt, etc. and apply RUST-OLEUM.

**IT PROTECTS LONGER**
Rust Oleum LASTS two to ten times longer than ordinary materials on most jobs. Every application gives maximum protection.

**RUST-OLEUM CORPORATION**
**2417 Oakton Street** **Evanston, Illinois**


# Association News

### Track Supply Association; B. & B. Supply Men's Association

At the time of going to press, 86 firms had already contracted for 155 booths at the joint exhibit of these two associations to be held at the Hotel Stevens, Chicago, September 20-22 in conjunction with the concurrent annual meetings of the Roadmasters and Bridge and Building Associations. That the exhibit will be considerably larger than last year is indicated by the fact that at this time a year ago only about 130 booths had been contracted for. With exhibit space still available, additional companies wishing to take part in the exhibit should address their requests to Lewis Thomas, director of exhibits, 59 E. Van Buren street, Chicago. Following is a list of the companies that have already contracted for space at the exhibit:

Achuff Railway Supply Company, St. Louis, Mo.
Air Reduction Sales Company, New York.
American Brake Shoe Company, Ramapo Ajax Division, Chicago.
The American Fork & Hoe Co., Cleveland, Ohio.
American Lumber & Treating Co., Chicago.
Armco Drainage & Metal Products, Inc., Middletown, Ohio.

(*Continued on page* 744)

### Meetings and Conventions

**American Railway Bridge and Building Association**—Annual meeting, September 20-22, 1948, Hotel Stevens, Chicago. Elise LaChance, secretary, 431 S. Dearborn street, Chicago 5.

**American Railway Engineering Association**—Annual Meeting, March 15-17, 1949, Chicago. W. S. Lacher, secretary, 59 E. Van Buren street, Chicago 5.

**American Wood-Preservers' Association**—Annual Convention April 26-28, 1949, St. Louis, Mo. H. L. Dawson, secretary-treasurer, 1429 Eye street, N.W., Washington 5, D. C.

**Bridge and Building Supply Men's Association**—Joint exhibit with Track Supply Association, September 20-22, 1948, Hotel Stevens, Chicago, during concurrent conventions of American Railway Bridge and Building Association and Roadmasters' Association. E. C. Gunther, secretary, 122 S. Michigan avenue, Chicago 3.

**Maintenance of Way Club of Chicago**—Next meeting, October 25, 1948. Headquarters 105 W. Adams street, Chicago 3.

**Metropolitan Maintenance of Way Club**—John S. Vreeland, secretary, 30 Church street, New York.

**Railway Tie Association**—Annual meeting, August 30-September 1, 1948, Greenbriar Hotel, White Sulphur Springs, W. Va. Roy M. Edmonds, secretary-treasurer, 610 Shell Building, St. Louis 3, Mo.

**National Railway Appliance Association**—Annual exhibit, Chicago, March 14-17, 1949, in connection with the A.R.E.A. convention. R. B. Fisher, secretary, 1 No. LaSalle street, Chicago 4.

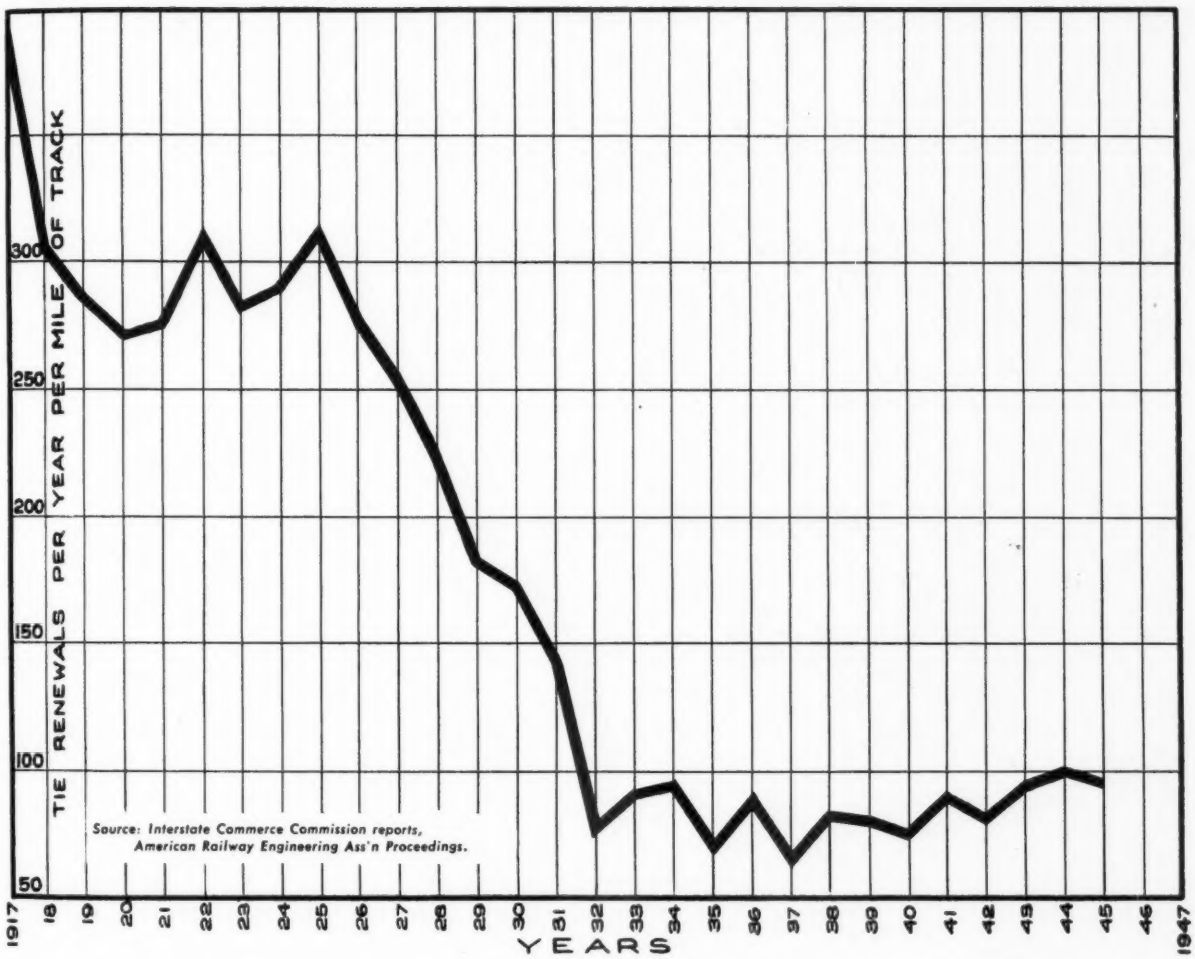
**Roadmasters' and Maintenance of Way Association of America**—Annual meeting, September 20-22, 1948, Hotel Stevens, Chicago. Elise LaChance, secretary, 431 S. Dearborn street, Chicago 5.

**Track Supply Association**—Joint exhibit with Bridge and Building Supply Men's Association, September 20-22, 1948, Hotel Stevens, Chicago, during concurrent conventions of Roadmasters' Association and American Railway Bridge and Building Association. Lewis Thomas, secretary, 59 E. Van Buren street, Chicago 5.

# An Outstanding Record

## *Renewal of Cross Ties Remarkably Low on*

# Chesapeake and Ohio Railway




In 1915, at the instigation of the American Creosoting Company, the Chesapeake and Ohio Railway was induced to embark upon the preservative treatment of its cross ties. At first only a part of the renewals were made with treated ties; soon, however, the great economy of Amcreco methods and organization became so clear that all renewals were so made.

The outstanding results, enormous economies, are evident from the above chart. The annual renewal of cross ties before the Amcreco organization began treating them was about 300 per track mile. As is seen from the chart, this was reduced to, and has been maintained at, less than 100.

Very greatly increased loads and traffic have occurred in these 33 years. These have been met by increased rail weight, tie plates, ballast and drainage, which have kept pace with the increased service, but the ties themselves have lasted because of Amcreco treatment.

This is an outstanding example of what has been done by American Railroads in improvement and economies and in forest conservation.

The improved and modern methods developed by Amcreco are available to all railroads and the American Creosoting Company solicits your inquiries.

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You get underfoot protection when you install Inland 4-Way Floor Plate. This modern skid-resistant steel flooring provides built-in safety wherever feet or wheels must go . . . floors, walkways, ramps, platforms, steps. INLAND STEEL CO., 38 S. Dearborn St., Chicago, Ill. Sales Offices: Chicago, Davenport, Detroit, Indianapolis, Kansas City, Milwaukee, New York, St. Louis, St. Paul.

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# 4-WAY FLOOR PLATE


## Association News (Cont'd)

Austin-Western Company, Aurora, Ill.
Barco Manufacturing Co., Chicago.
Bernuth Lembcke Company, Inc., New York.
The Buda Company, Harvey, Ill.
Caterpillar Tractor Company, Peoria, Ill.
Chain Belt Company, Milwaukee, Wis.
Chicago Pneumatic Tool Company, New York.
Chipman Chemical Company, Inc., Bound Brook, N. J.
Crerar, Adams & Co., Chicago.
Cullen-Friestedt Company, Chicago.
Dearborn Chemical Company, Chicago.
The Duff-Norton Manufacturing Co., Pittsburgh, Pa.
Electric Tamper & Equipment Co., Ludington, Mich.
Fabreeka Products Co., Inc., Boston, Mass.
Fairbanks, Morse & Co., Chicago.
Fairmont Railway Motors, Inc., Fairmont, Minn.
Hayes Track Appliance Company, Richmond, Ind.
W. F. Hebard Company, Chicago.
Homelite Corporation, Port Chester, N. Y.
Hubbard & Co., Pittsburgh, Pa.
Illinois Malleable Iron Company, Chicago.
Independent Pneumatic Tool Company, Chicago.
Ingersoll-Rand Company, New York.
Johns-Manville, New York.
O. F. Jordan Company, East Chicago, Ind.
Joyce-Cridland Company, Dayton, Ohio.
Kalamazoo Manufacturing Company, Kalamazoo, Mich.
The Kershaw Company, Inc., Montgomery, Ala.
Koehring Company, Milwaukee, Wis.
The Lehon Company, Chicago.
Le Roi Company, Milwaukee, Wis.
R. G. Le Tourneau, Inc., Peoria, Ill.
Link-Belt Speeder Corporation, Cedar Rapids, Ia.
The Lundie Engineering Corporation, New York.
Mack Welding Company, Duluth, Minn.
Maintenance Equipment Company, Chicago.
Mall Tool Company, Chicago.
Marvel Equipment Company, Chicago.
Massey Concrete Products Co., Chicago.
The Master Builders Company, Cleveland, Ohio.
Midwest Forging & Mfg. Co., Chicago.
Modern Railroads Publishing Company, Chicago.
Mine Safety Appliances Company, Pittsburgh, Pa.
Morrison Metalweld Process, Inc., Buffalo, N. Y.
Murdock Manufacturing & Supply Co., Cincinnati, Ohio.
Nordberg Manufacturing Company, Milwaukee, Wis.
Northwestern Motor Company, Eau Claire, Wis.
Oliver Iron & Steel Corporation, Pittsburgh, Pa.
D. W. Onan & Sons, Minneapolis, Minn.
Overhead Door Corporation, Hartford City, Ind.
The Oxweld Railroad Service Company, Chicago
The P. & M. Co., Chicago.
Pettibone Mulliken Corporation, Chicago.
The Pocket List of Railroad Officials, New York.
Power Ballaster Division of Pullman-Standard Car Manufacturing Company, Chicago.
The Q and C Co., New York.
Racine Tool & Machine Co., Racine, Wis.
The Rail Joint Company, Inc., New York.
Railroad Accessories Corporation, New York.
Railroad Equipment, New York.
Railroad Products Company, Cincinnati, Ohio.
The Rails Company, New Haven, Conn.
*Railway Engineering & Maintenance*, Chicago.
Railway Purchases and Stores, Chicago.
Railway Track-Work Company, Philadelphia, Pa.
Reade Manufacturing Company, Chicago.
Roseman Tractor Mower Co., Evanston, Ill.
Rust-Oleum Corporation, Evanston, Ill.
Safety First Shoe Company, Holliston, Mass.
Sperry Rail Service, Hoboken, N. J.
Teleweld, Inc., Chicago.
Templeton, Kenly & Co., Chicago.
Thornley Railway Machine Company, Joliet, Ill.
Timber Engineering Company, Washington, D. C.
United Laboratories, Inc., Cleveland, Ohio.
Gradall Division of The Warner & Swasey Co., Cleveland, Ohio.
Warren Tool Corporation, Chicago.
Woodings-Verona Tool Works, Chicago.
Woolery Machine Company, Minneapolis, Minn.
Worthington Pump & Machinery Corp., Holyoke, Mass.

### Roadmasters' Association

President A. B. Chaney has called a meeting of the Executive committee of the association in Chicago on July 12 to review the six technical committee reports

(*Continued on page* 746)

# Industry's $6 Billion Problem

Rust, corrosion and deterioration take an estimated $6,000,000,000 annual toll. Much of this loss can be prevented by the use of corrosion-resistant equipment and protective coating materials.

Koppers is one of the largest manufacturers of specialized coatings to protect metal, concrete and masonry. These coatings are waterproof, resistant to chemical fumes, sunlight, and industrial atmospheres. They have an unequalled performance record in virtually every industry. Application requires no special skill.

Koppers Protective Coatings include: Bituplastic,* Bitumastic No. 50, Bitumastic Super-Service Black, Bitumastic Tank Solution, Bitumastic Black Solution, and Bitumastic Hi-Heat Gray.

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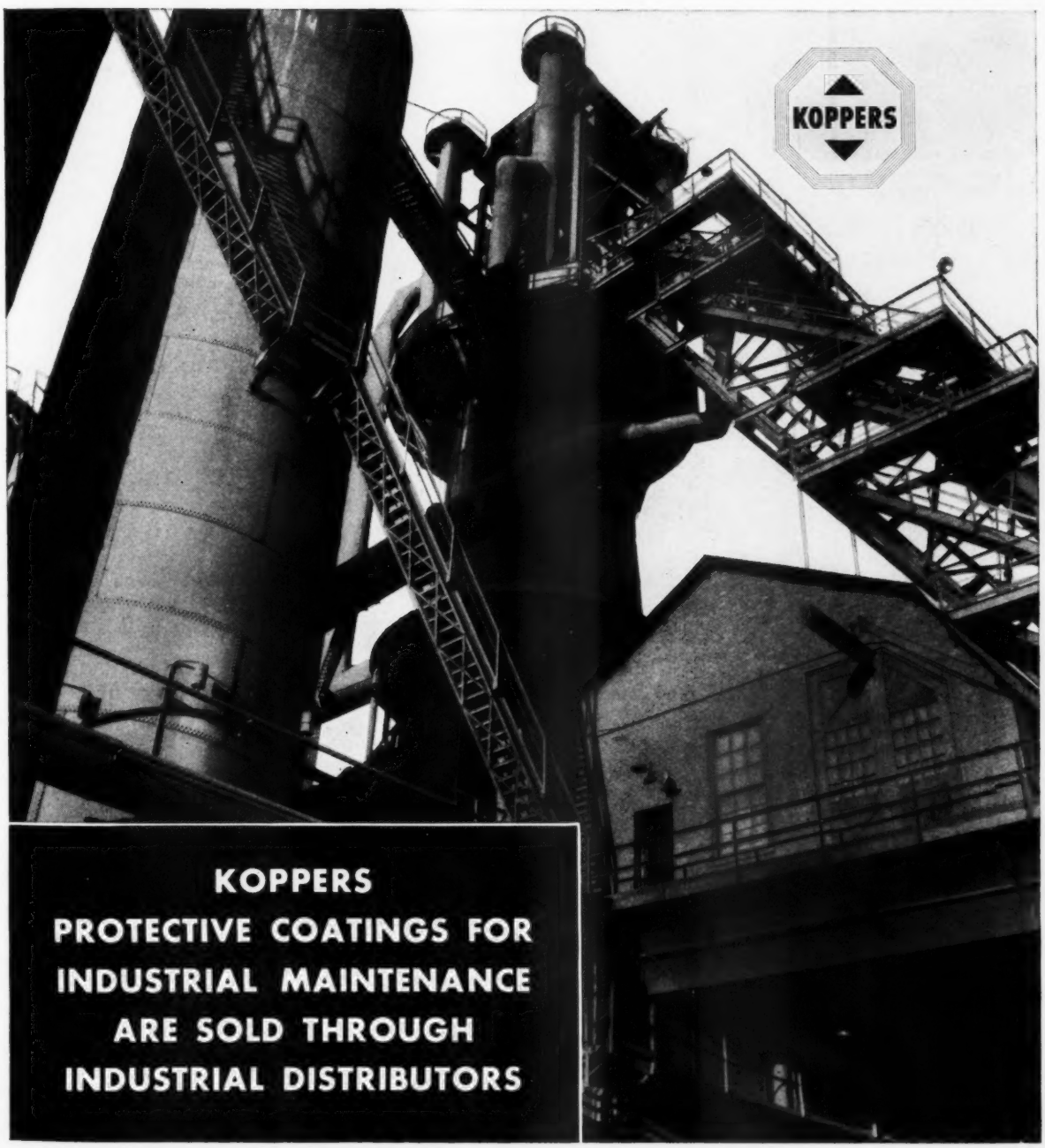
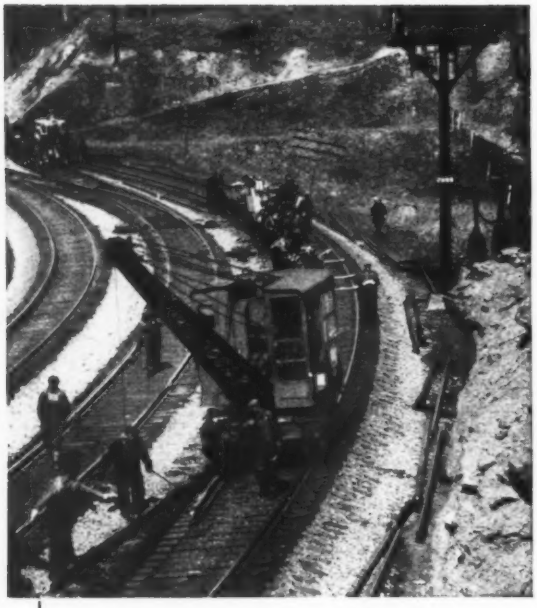
**KOPPERS COMPANY, INC.** DEPARTMENT 708T PITTSBURGH 19, PA.




**KOPPERS PROTECTIVE COATINGS FOR INDUSTRIAL MAINTENANCE ARE SOLD THROUGH INDUSTRIAL DISTRIBUTORS**



**TRACK WORK A SPECIALTY!**

Track work is a Burro specialty because these cranes have everything it takes — speed, stamina, capacity and responsive control to the operator. Track gangs are more efficient when they work with a Burro because Burros were designed for railroad work —not adapted to it. Put a Burro to work in any one of the hundreds of maintenance-of-way jobs and see why it's saving time and costs for most of the country's railroads.

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**Only BURRO CRANES Have:**

- Fast travel speeds — up to 22 M.P.H.
- Draw Bar Pull of 7500 lbs. (often eliminates need for work train or locomotive).
- Elevated Boom Heels for working over high sided gondolas.
- Short tail swing—will not foul adjoining track.
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Style CC402
WILLSON Cover-Alls* are easy to slip on over prescription glasses.

**Eye Protection with Room to Spare for Prescription Glasses**

Spectacle wearers are fully protected in hazardous occupations with WILLSON Cover-All* safety goggles. Deep eye cups give sufficient clearance for all types of frames. The adjustable bridge and adjustable elastic headband assure comfortable fit for all head sizes. Super-Tough* lenses meet tests for impact resistance, optical clarity and uniformity of heat treatment.

Cover-All protection also available in two new WILLSON Mono-Goggles with plastic frames and large, one-piece plastic lenses.

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**WILLSON PRODUCTS, INC., 243 WASHINGTON STREET • READING, PA.**


## Association News (Cont'd)

now under way, for presentation at the annual convention of the association in Chicago, September 20-22. All committee chairmen are invited to attend this meeting in order that they might present their reports in person and to incorporate such suggestions as may be made by the Executive committee.

### Metropolitan Maintenance of Way Club

The annual outing of the club was held at the Out O' Bounds Country Club, Suffern, N.Y., on June 17. The affair was attended by 126 railway men and 71 supply men who participated in golf, softball, horseshoes, quoits and other sports. A picnic-style lunch was served.

### Bridge and Building Association

The Executive committee of the association met in Chicago on June 28, in company with a number of the chairmen of the various technical committees, to perfect plans for the convention to be held at Chicago, September 20-22, concurrent with the annual meeting of the Roadmasters' association. The two principal items of business at the meeting were the final approval of the over-all program for the convention, and detailed preliminary review of each of the committee reports.

### American Railway Engineering Association

No meetings of standing committees have been scheduled to be held during July. Ten such meetings were held during June as follows: Yards and Terminals at Cleveland, Ohio, on June 2; Buildings at New York on June 3 and 4; Highways at Chicago on June 8; Waterproofing at Chicago on June 10; Maintenance of Way Work Equipment at Huntington, W. Va. on June 10, followed by an inspection trip the next day; Wood Bridges and Trestles at Madison, Wis., on June 10 and 11; Ties at Rome, N.Y., on June 8, followed by inspections of creosoting plants and tie storage yards at several places; Economics of Railway Labor at New York on June 22, followed by an inspection trip over the Delaware, Lackawanna & Western; Economics of Railway Location and Operation at St. Paul, Minn., on June 23 and 24; and Water Service and Sanitation at Chicago on June 29.

# Supply Trade News

### General

**The Link-Belt Company** has announced plans for the construction of a new plant in Houston, Tex. The new building will occupy a 10-acre plot and contain approximately 45,000 sq. ft. of floor space.

(*Continued on page* 748)

# Barber-Greene

## Cuts unloading time as much as 90%

## Cuts costs in HALF!

***A hopper-car unloaded to trucks or to stock pile by one man . . . in forty-five minutes!*** This is the proved day-to-day performance of the new B-G 358 Hopper-Car Unloader and 363 Conveyor.

**BG Model 358 All-Purpose Unloader**

**MODEL 358 ALL-PURPOSE UNLOADER** handles any material. Working over rails or in pits, it unloads a carload in as little as 45 minutes, with no jamming, no delays. Positive non-slip drive, sturdy antifriction bearings, Alemite fittings . . . assure years of dependable service. A perfectly balanced machine, it moves easily by hand, trails at road speeds.

**BG Model 363 Portable Conveyor**

**MODEL 363 PORTABLE CONVEYOR** establishes a new standard of lightweight portability combined with strength and efficiency. Pneumatic-tired wheels swivel for radial stock-piling; self-cleaning hopper end with removable cover and hopper plates assures longer belt life; antifriction bearings and belt idlers provide smooth operation. 24" belt; lengths, 25', 30', and 35'.

Send for literature! Address Barber-Greene Company, Aurora, Illinois.

104A

**Barber-Greene**

*Constant Flow Equipment*

## keep 'em on time

## with clean water mains

When train servicing lags there's a good chance that an inadequate supply of water due to clogged pipes is the cause. Why tolerate delay when the National Water Main Cleaning Co. can quickly restore your mains to at least 95% of their original capacity?

Our engineers will gladly submit facts and figures on how National has solved this costly problem for other railroads.

## National "Know-How" Pays

BEFORE AFTER

**NATIONAL WATER MAIN CLEANING CO.**
51 CHURCH STREET, NEW YORK 7, N. Y.

## Supply Trade News (Cont'd)

### Personal

**Danforth K. Heiple** has been promoted to chief field engineer for **R. G. LeTourneau, Inc.,** to succeed **R. C. Lewis.**

The **Link-Belt Company** has opened a district sales office in Albany, N.Y., with **J. Charles Bullock,** formerly district sales manager at Schenectady, N.Y., in charge. The firm's Schenectady office has been discontinued.

The **Tanglefoot Company** has announced the appointment of **R. W. Preikschat,** Chicago, as distributor in the railroad field. Mr. Preikschat will handle the company's complete line of sprayers and insecticides.

**Robert Aldag, Jr.,** sales engineer for **Fairbanks, Morse & Co.,** at Chicago, has been promoted to manager of the sales engineering department, Railroad division.

**William S. Saylor,** manager of sales of the **Carnegie-Illinois Steel Corporation** (subsidiary of **U. S. Steel Corporation**), at Cleveland, Ohio, has been appointed manager of the district sales office at Detroit, Mich. He succeeds **Francis C. Hardie,** who has been assigned other duties with the company at Pittsburgh, Pa. Mr. Saylor is succeeded by **James T. O'Connor.**

### Trade Publications

*(To obtain copies of any of the publications mentioned in these columns, use postcards, page 739)*

**Koehring Karkrane**—A four-page bulletin describing its 205 Karkrane has been published by the Koehring Company. The pamphlet is liberally illustrated with pictures of the crane in operation on a variety of off-track and on-track tasks.

**Water Conditioning**—The Permutit Company has issued a 12-page pamphlet in recognition of a decade of progress in water softening and conditioning. The leaflet briefly describes some of the properties of Zeo-Karb as a cation exchanger.

**Fire Extinguishers**—The Ansul Chemical Company has published an attractive 20-page illustrated catalog describing its complete line of dry-chemical fire extinguishers. The bulletin contains charts showing the characteristics of approved hand fire extinguishers and the comparative effectiveness of extinguishers on flammable liquid fires.

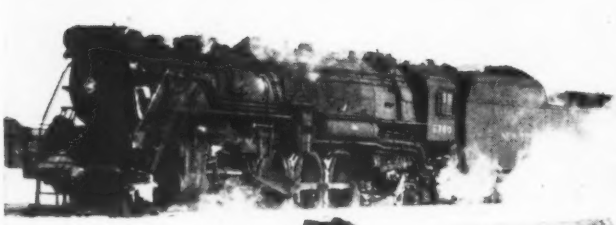
**Welding Instruction Books**—The Air Reduction Sales Company has released a six-page folder dealing with its five welding and cutting instruction books. The pamphlet outlines the contents of these volumes, two of which are devoted to arc-welding and two to oxy-acetylene welding and cutting. The fifth book is a manual of design.

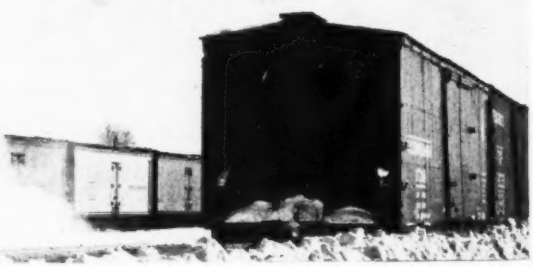
**Traversing Base Jacks**—A two-page, illustrated bulletin describing its traversing base jacks has been issued by the Duff-Norton Manufacturing Company. This pamphlet, AD 4-348, outlines the sizes, weight capacity and operation of these jacks, which are said to be designed for use with Duff-Norton lifting jacks for rerailing locomotives and railroad cars. The bulletin also contains several pictures showing the jacks in operation.

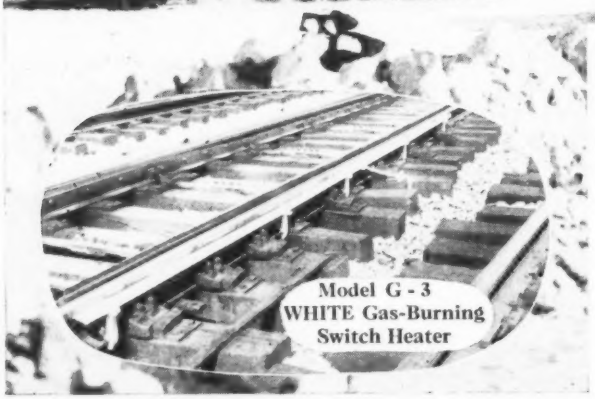
**Crawler Tractor**—A colorful, 24-page book describing its new TD-24 crawler tractor has been released by the International Harvester Company. The brochure describes the tractor's hydraulically-controlled "Planet Power" steering system, which is said to increase its work capacity and give it new handling ease. Also described are the high-speed track frame, and the all-weather starting system of the six-cylinder 180-hp. Diesel engine. Included in the book are a large number of sectional views, line drawings and on-the-job photographs.

**Kinnear Doors**—The Kinnear Manufacturing Company has issued a 28-page illustrated booklet describing its complete line of rolling doors. The bulletin is divided into six sections as follows: Service type doors; fire doors and shutters; Rol-Top doors; hangar doors, steel rolling grilles; and special doors. Each section contains specifications and drawings of the various types of doors available, and photographs of typical installations.


# WHITE Switch Heaters Proved Best in the New York Blizzard







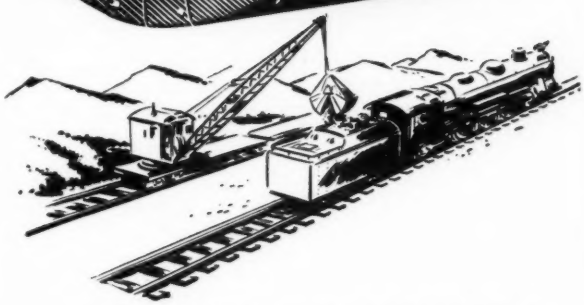

**In the recent blizzard around New York City WHITE Gas-Burning Switch Heaters AGAIN proved that they are the only snow melters which can successfully cope with maximum storms. There were no "clogged" switches with WHITE heaters.**

**Write for descriptive circulars.**

White Manufacturing Company

**ELKHART, INDIANA**

*E. R. Mason, New York; Reade Mfg. Co., Chicago*

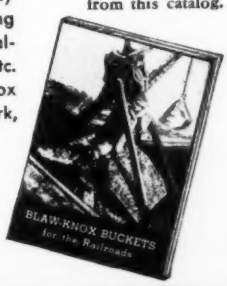


# BUSY BUCKETS

*For the railroads* Blaw-Knox builds buckets that are kept busy on many jobs . . . fueling engines, rehandling from stock piles, ash pit service, ballast rehandling, barge clean-up, etc. For a quick appraisal of Blaw-Knox Buckets widely used for railroad work, write for Bulletin 1989.

**BLAW-KNOX DIVISION**
of Blaw-Knox Company
2054 Farmers Bank Bldg.
Pittsburgh 22, Pa.

You can select *the bucket you need* from this catalog.




**BLAW-KNOX BUCKETS**

# *In the Field of Irrigation*

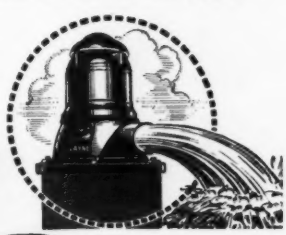
It is in the field of Irrigation that Layne Well Water Systems and Layne Vertical Turbine Pumps are most appreciated for their outstanding superiority of design, construction and quality. Of all places, the Irrigation field must have the utmost in dependability for long periods of continuous pumping. It is in this field that Layne water producing equipment is easily a 10 to 1 favorite in every case where ground water is used. Such leadership is highly complimentary to excellence of performance.

Basically, Layne Well Water Systems are extremely practical in design, and this design is noted for high efficiency. And supporting practical design and high efficiency, there is that well known Layne quality that assures longer life and practically no upkeep expense.

Layne Well Water Systems are designed for use in all situations where huge quantities of water must be produced at the lowest possible cost; packing houses, municipalities, factories, chemical processing plants, milk plants, petroleum refineries, railroads, etc.

For further interesting facts, literature, bulletins, etc., address

**LAYNE & BOWLER, INC.**
***General Offices***
**MEMPHIS 8, TENNESSEE**

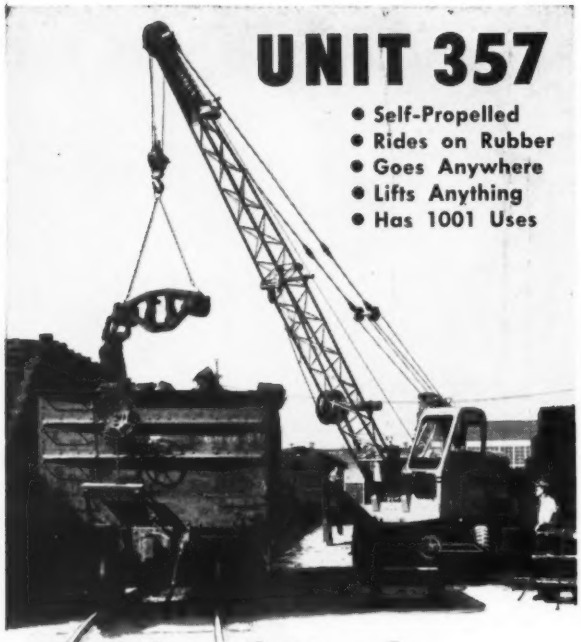


**LAYNE**
**WELL WATER *Systems***

**AFFILIATED COMPANIES:** Layne-Arkansas Co., Stuttgart, Ark. ★ Layne-Atlantic Co., Norfolk, Va. ★ Layne-Central Co., Memphis, Tenn. ★ Layne-Northern Co., Mishawaka, Ind. ★ Layne-Louisiana Co., Lake Charles, La. ★ Louisiana Well Co., Monroe, La. ★ Layne-New York Co., New York City ★ Layne-Northwest Co., Milwaukee, Wis. ★ Layne-Ohio Co., Columbus, Ohio ★ Layne-Pacific, Inc., Seattle, Washington ★ Layne-Texas Co., Houston, Texas ★ Layne-Western Co., Kansas City, Mo. ★ Layne-Western Co. of Minnesota, Minneapolis, Minnesota ★ International Water Supply Ltd., London, Ontario, Canada ★ Layne-Hispano Americana, S. A., Mexico, D. F.

# UNIT 357

- Self-Propelled
- Rides on Rubber
- Goes Anywhere
- Lifts Anything
- Has 1001 Uses



## Inside of Yard
## Outside of Yard
## On the Tracks
## Off the Tracks

**UNIT 357 handles easily... Works efficiently in close quarters.**

The ideal machine for right-of-way maintenance . . . railroad shops . . . or stores departments. Ready for action with a push of the starter. Cuts maintenance costs to rock bottom. Fully convertible. Gas or Diesel power. Ask for literature.

Operated by ONE man . . . Powered by ONE engine . . . Controlled from ONE position in UNIT's safety-promoting FULL VISION CAB.

CONTACT FACTORY DIRECT for Price and Delivery or *See Your Dealer*

**UNIT CRANE AND SHOVEL CORP.**

6403 W. BURNHAM ST., MILWAUKEE 14, WIS., U. S. A.

SHOVELS • DRAGLINES • CLAMSHELLS
CRANES • TRENCHOES • MAGNETS



# PITTSBURGH-ERIC PROCESS

**Lectumen**

## PIPE LINING

**FOR WATER MAINS**
**3" to 24" I.D.**

Samples of pipe before and after cleaning and lining by Pittsburgh-Eric Process.

**17,100 ft.—24 in. MAIN**
**WATER DEPARTMENT,**
**CITY OF CHARLOTTE, N.C.**

Before Cleaning "C"—69
After Cleaning "C"—130
After Coating "C"—130

G.P.D. Before Cleaning—5.6 M.G.D.
G.P.D. After Coating—10.4 M.G.D.
4.8 M.G.D.—*INCREASE*

*For the utmost in water main efficiency, get the full details from our nearest branch TODAY!*

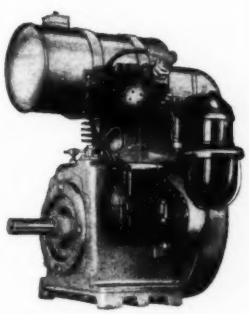
**PITTSBURGH PIPE CLEANER CO.**
133 DAHLEM ST. PITTSBURGH 6, PA.
PHILADELPHIA · BALTIMORE · WASHINGTON
NEW YORK · BUFFALO · CHICAGO
CINCINNATI · ST. LOUIS · DETROIT · BOSTON

# The REAL MEASURE of ENGINE VALUE is "H. P. HOURS" of POWER SERVICE

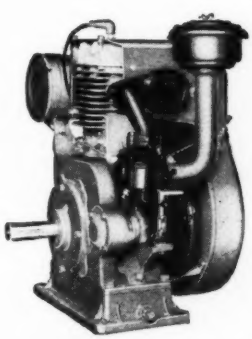
It isn't the original H.P. rating of an engine that counts but rather, the number of *H.P. Hours* of power service it will deliver during its lifetime. This, in the final analysis, is the real measure of *engine value.*

Wisconsin Air-Cooled Engines deliver the most H.P. Hours because they are designed and built for rugged, heavy-duty service. For example: every Wisconsin Engine, from the smallest to the largest, runs on Timken tapered roller bearings at both ends of the crankshaft to take up end-thrust and provide the best protection against bearing failure . . . at the same time assuring a smooth-running engine. This is just one typical detail that stands back of "Most H.P. Hours" of on-the-job power service.

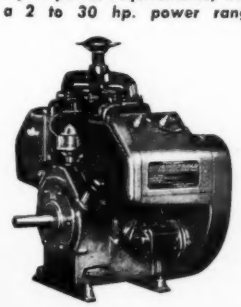
***You can't go wrong if you specify "Wisconsin Air-Cooled Engines" to meet your power requirements, within a 2 to 30 hp. power range.***



Models AB and AK, 4-cycle single cyl. engines, 2 to 4 hp.



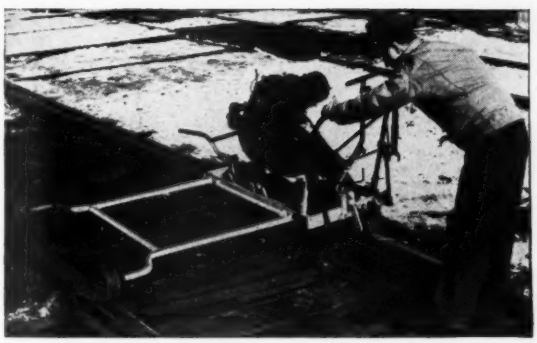
Models AEH, AFH, AGH, AHH 4-cycle, single cyl., standard engines, 4 to 9 hp.



V-type, 4-cylinder models, 3 sizes, 15 to 30 h.p.

**WISCONSIN MOTOR Corporation**
MILWAUKEE 14, WISCONSIN
*WORLD'S LARGEST BUILDERS OF HEAVY-DUTY AIR-COOLED ENGINES*

# GRIND AWAY TRACK WORK COSTS



*with the*

## P-16-D Portable Stock Grinder

**Now—add the new Model P-16-D Portable Stock Rail Grinder to your track equipment and get the latest machine for removing excess metal from switch points and stock rails. These advantages spell added savings for you:**

- All grinding equipment is swivel mounted.
- Locking device holds grinding wheel securely when not in use. Prevents damage during transport.
- Grinder head can be swiftly adjusted to follow the alignment of switch point or stock rail.
- Hand wheel provides lateral adjustment. Coupled with double cup grinding wheel, grinder completes job on stock rail and switch point without turning machine around.
- Light and portable machine handles easily under traffic. Gets on and off track fast.

**Save time . . . save labor costs by putting the P-16-D Portable Stock Grinder in your equipment shed. Further details sent upon request.**

4354

**Railway Trackwork Co.**
3207 KENSINGTON AVE., PHILADELPHIA 34, PA.
*AGENTS FOR*
Kershaw-Railway Maintenance Equipment and Mark-Rite Paint Marker

# THIS BROWNING TRAVELED 27 MILES A DAY FOR TWO YEARS

BROWNING'S rugged, simple construction shows up on this job of traveling, switching and handling heavy stone blocks over 27 miles of the roughest kind of track.

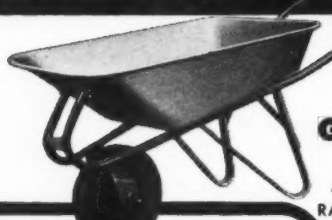
Whatever your operation, The Browning Diesel is the Locomotive Crane that will stand up year after year under the toughest kind of punishment —and save you repair expense, and delays.

Bulletin No. 114718 describes new Browning features of design, construction and operation. Write for it today.

**THE BROWNING CRANE & SHOVEL CO.**
16224 WATERLOO ROAD, CLEVELAND 10, OHIO

**BROWNING**
LOCOMOTIVE, WAGON, TRUCK and TU-CONTROL *Cranes*

## CHASSIS *Specially* BUILT FOR SMALLER TRAY



**GAR-BRO**
BARROW
MODEL 50-A
RATED CAPACITY
4 CUBIC FEET

Not just a small tray on the standard large size chassis; not a cheaply constructed barrow; not a garden barrow "for home use only." The GAR-BRO Model 50-A is an all-purpose utility barrow with the same high-quality construction features found in all GAR-BRO Barrows. The chassis, of selected steel tubing, is especially built for the smaller tray. Trays are formed of 14-gauge high strength aluminum alloy over jigs and electric welded; no thin spots as on drawn trays. Double rocker-type dumping knees assure stable end dumping with full control. *Write GAR-BRO today.*

DEALER INQUIRIES INVITED

**GAR-BRO**
MANUFACTURING COMPANY
2416 E. 16th ST. LOS ANGELES 21

*New Edition*

## SIMPLIFIED CURVE AND SWITCH WORK

**By WALTER F. RENCH**
*Formerly Supervisor on the Pennsylvania Railroad*

The proved accuracy of these methods has caused them to be accepted as standard practice on many roads. Complex algebraic and geometric calculations are reduced to their simplest form and as nearly as possible to terms of simple arithmetic. Application of these calculations to the actual job is made plain by brief explanations. Drawings clarify and make the meaning of the text unmistakable. Tables of dimensions and graphs still further meet the practical needs of track foremen.

**CONTENTS**

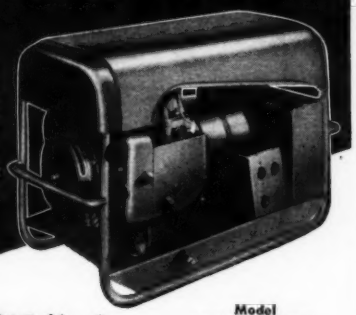
Curves: The Relining of Curves with a String—Preliminary Study of the Curve—The Solution of String Lining Problems—Superelevation of Curves—The Spiral—The Vertical Curve—Economics of Curves—Practical Switch Connections: Essential Elements in the Design of Switch Connections—Rules for Computing Switch Dimensions—Rules for Various Functions of Turnouts—Practical Considerations in Installing Turnouts—Methods in Installing and Maintaining Switches—Siding Location: Simplified Field Work—Special Practices.

1947. 5th. 212 pages, 24 illus., index, 5 x 7, flexible. $3.00

**BOOK DEPARTMENT**
**Simmons-Boardman Publishing Corp.**
**30 Church St., New York 7, N. Y.**

# New ONAN LIGHTWEIGHT ELECTRIC PLANT

## 5000 WATTS D.C.



*Weighs only 315 lbs.!*

Model 5CK-115M, 5,000 watts, 115 volts D.C.

Use fast-working electrical tools on any construction or maintenance job with this high-capacity, portable, compact electric plant. Equipped with four-receptacle box for direct plug-in of tools or lights. Available with carrying frame or dolly-mounted. Powered by Onan 10 HP horizontally-opposed, two-cylinder, 4-cycle, air-cooled engine. Unusual operating economy. Shipped complete . . . ready to go!

**ONAN ELECTRIC PLANTS**—*A.C.: 350 to 35,000 Watts in all standard voltages and frequencies. D.C.: 600 to 15,000 Watts, 115 and 230 Volts. Battery Chargers: 500 to 6,000 Watts, 6, 12, 32 and 115 Volts.*

**ONAN AIR-COOLED ENGINES**—*CK: 2-cylinder opposed, 10 HP. BH: 2-cylinder opposed, 5.5 HP. IB: 1-cylinder, 3.25 HP.*

**D.W. ONAN & SONS INC.**
4562 Royalston Ave., Minneapolis 5, Minn.

*Write for Catalog*

Onan PRODUCTS

## ONAN ELECTRIC PLANTS

For Clearing the
## RIGHT OF WAY

OTTAWA "BUZZ MASTER"

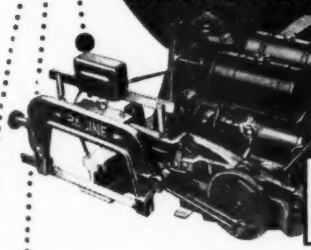
**Self-Propelled—Cuts Trees, Brush, Saplings Does Work of Several Men!**

This powerful machine is the last word in land clearing efficiency. Cuts brush and saplings as it pulls itself uphill as well as on level ground. Equipped with brakes for hillside work. Has 30" nickel chrome steel saw, swivel axle for tree cutting (no pinching), adjustable saw shaft, safety clutch, many other desirable features. The Buzz Master saves you time, labor and money. Helps beautify your property at a minimum of time and expense. No railroad company can afford to be without the Buzz Master. Demonstrations arranged. A 48" sickle bar attachment and post hole digger attachment with 10 x 36" auger are also available. Write for particulars.

**OTTAWA MFG. CO.**
5-838 Penn St.,
Ottawa, Kansas

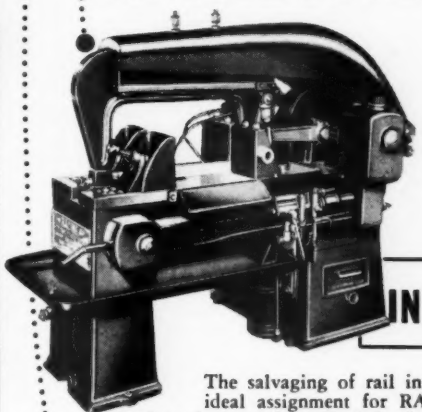
**World's Largest and Oldest Manufacturer of Wood Saws**

For
## High Speed
# RAIL CROPPING
## USE RACINE METAL CUTTING SAWS



## ON TRACK

The RACINE Portable Rail Cutter is light, yet fast and accurate. Designed especially for road use, it can be lifted and moved by two men, thus speeding the job and preventing traffic delays which might be caused by heavier on-track equipment. The RACINE Rail Cutter is compact, individually powered, sturdy. In operation, it is a one-man tool, providing smooth rail cropping. The finished cuts are without thermal cracks that often lead to rail failure.



## IN YARDS

The salvaging of rail in the yards is an ideal assignment for RACINE hydraulic metal cutting machines. Both in single and multiple rail cutting, RACINE saws crop split, worn or battered ends quickly and cleanly. RACINE machines, in capacities from 6" x 6" to 20" x 20", are hydraulically operated and controlled. They are simple in design and operation, rugged in construction, low on maintenance cost.

*Ask for RACINE Catalog No. 12 and Bulletin 706A. Address RACINE TOOL AND MACHINE COMPANY, 1738 STATE ST,. RACINE, WISC.*

STANDARD FOR QUALITY AND PRECISION — RACINE TOOL and MACHINE CO. — RACINE

## RACINE

STANDARD FOR QUALITY AND PRECISION

## Dozens of Repair Jobs in a single day.... with TRAIL-O-ROLLER

Speed, efficiency and economy make Littleford's TRAIL-O-ROLLER an invaluable part of your black top maintenance crew. It trails the maintenance truck at any speed, yet brings the compaction of a five-ton tandem roller to your crossing and platform repairs. Patented hydraulic lift permits changing from trailing to rolling or back again in two minutes flat! Better crossings make friends. Write for catalogue.

LB LITTLEFORD

LITTLEFORD BROS., INC.
471 E. Pearl St., Cincinnati 2, Ohio

UNIVERSAL
CONCRETE CRIBBING
FOR BRIDGE ABUTMENTS

The fast, flexible way to build retaining and load-bearing walls. Pre-cast, ready for fast installation with unskilled labor. Open or closed face type. Build to any height, straight or curved. 100% salvage if moved. Free catalog and engineering data. Write today.

Universal
CONCRETE PIPE CO.
297 S. HIGH ST., COLUMBUS, OHIO

Third Edition

## TRACK AND TURNOUT ENGINEERING

By C. M. Kurtz

*Formerly Assistant Engineer, Southern Pacific Company*

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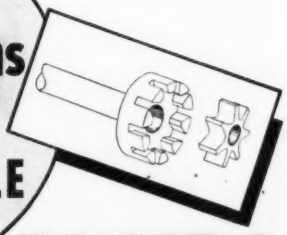

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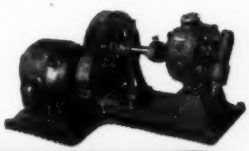

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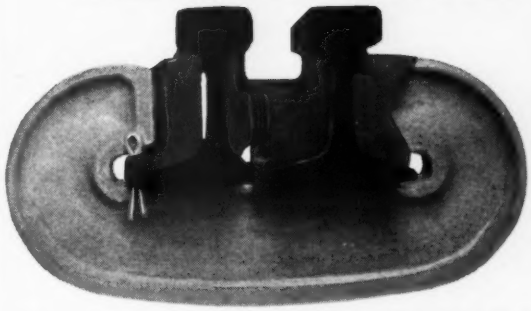

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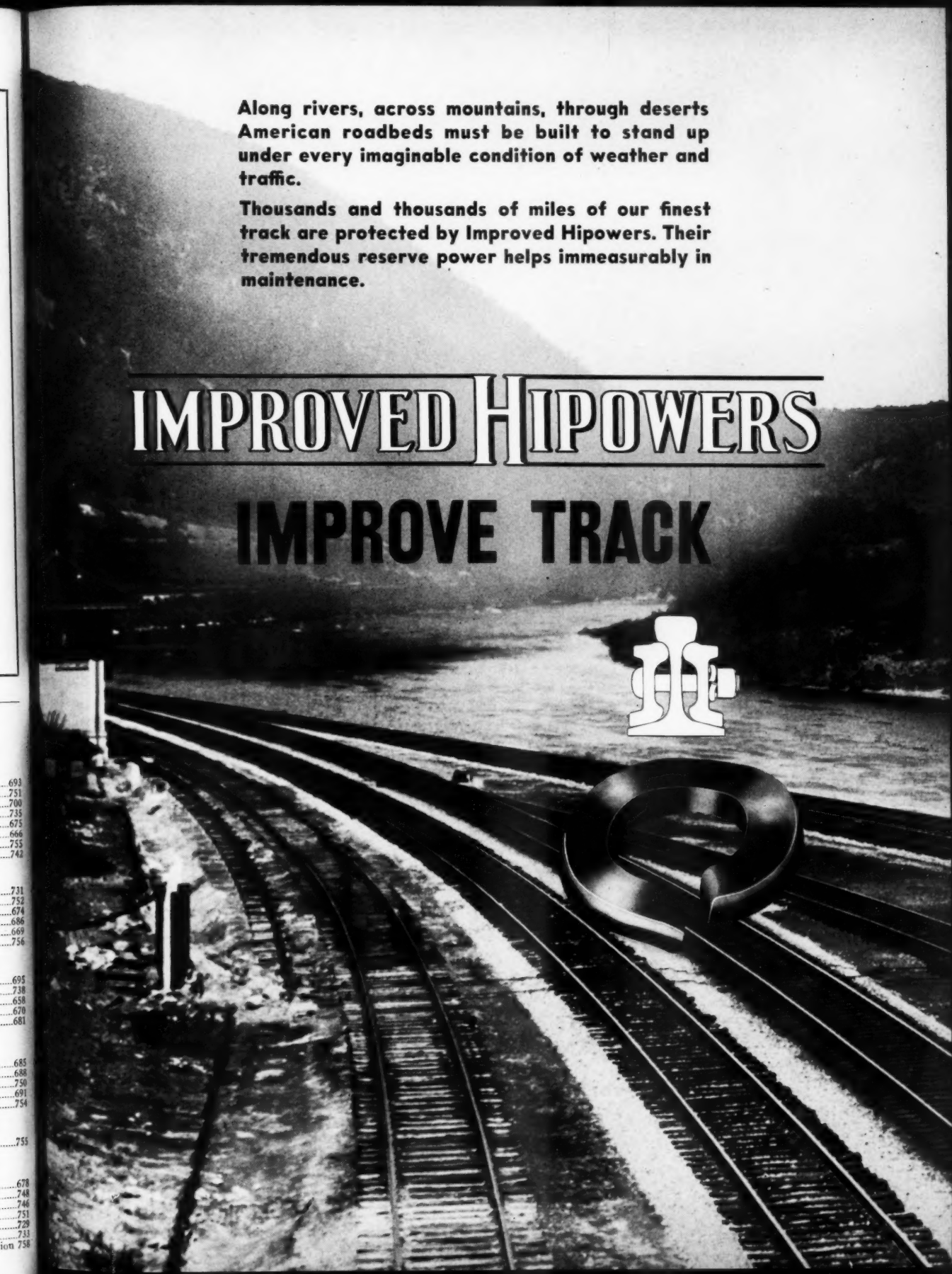
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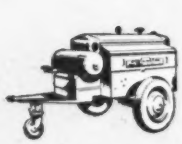

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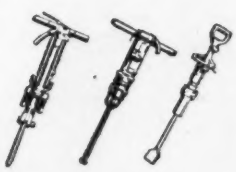

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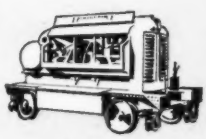

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